JANUARY 14, 1952

STEEL

THE WEEKLY MAGAZINE OF METALWORKING

MORE OIL

Metalworking Helps Bring It In

—page 36

NEW FORMING CONCEPTS
—*Extruding Plus Forging Aluminum, p. 54*

BRAZING STAINLESS
—*No Flux Needed, p. 57*

BORON STEELS
—*10 Million Tons a Year? p. 66*

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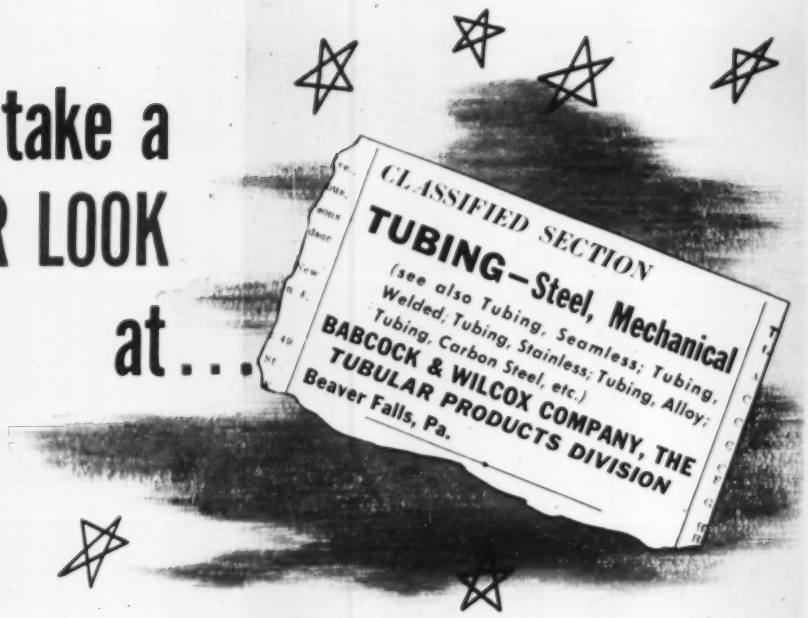
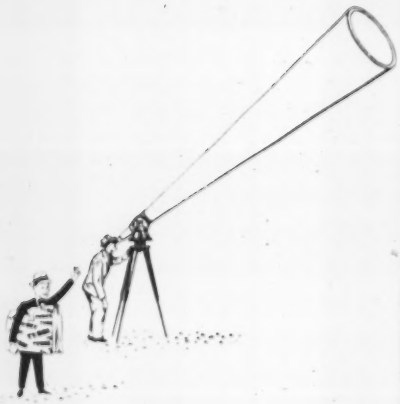
take a CLOSER LOOK at...


CLASSIFIED SECTION
TUBING—Steel, Mechanical
(see also Tubing, Seamless; Tubing, Welded; Tubing, Stainless; Tubing, Alloy; Tubing, Carbon Steel, etc.)
BABCOCK & WILCOX COMPANY, THE
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.



for:

1. Seamless and welded Tubing.
2. Hot-finished, hot-rolled, cold-drawn or cold-rolled, and "Roto-Rocked" tubing.
3. Wide choice of Carbon, Alloy, and Stainless grades.
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6. Unannealed, annealed, tempered, normalized, or otherwise heat-treated conditions, as required.
7. Wide choice of surface finishes — as rolled, as drawn, as welded, flash removed, turned, scale-free, and polished.
8. Round, square, rectangular, oval, and other shapes.
9. Specialty fabrication such as upsetting, expanding, bending, safe-ending, and machining.

Because steel tubes are critical materials, ask Mr. Tubes—your B&W Tube Representative—to help you determine the best available kind for your requirements. He may be able to save you time and material.

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
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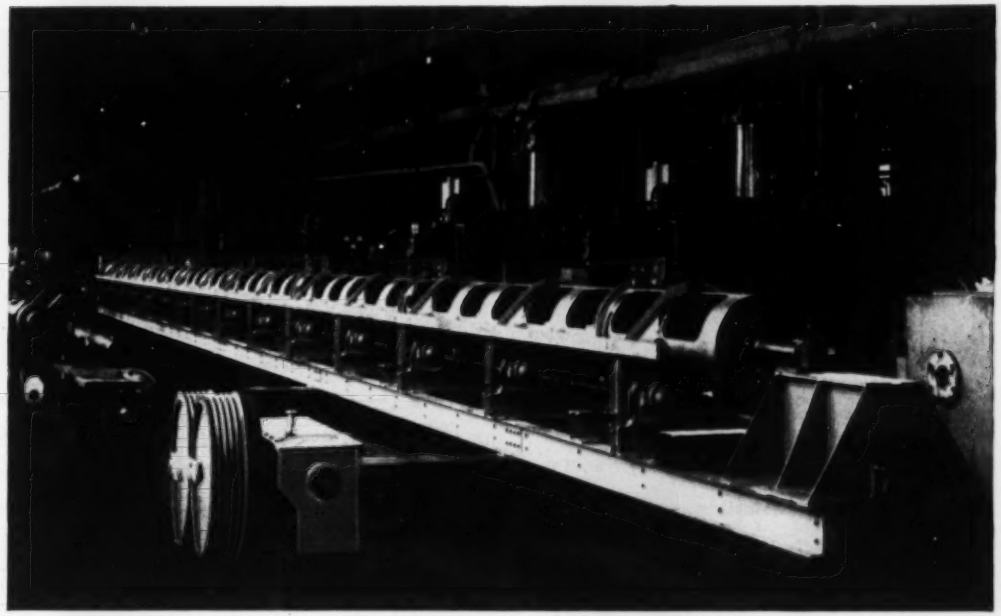
Alliance, Ohio—Welded Carbon Steel Tubing

Sales Offices: Beaver Falls, Pa. • Boston 16, Mass. • Chicago 3, Ill. • Cleveland 14, Ohio • Denver 1, Colo. • Detroit 26, Mich. • Houston 2, Texas • Los Angeles 15, Cal. • New York 16, N. Y. • Philadelphia 2, Pa. • St. Louis 1, Mo. • San Francisco 3, Cal. • Syracuse 2, N. Y. • Toronto, Ontario • Tulsa 3, Okla.

B&W SEAMLESS and WELDED TUBES

TA-1604M



Stranding Machine built largely by *WELDING*

These fabricated bed plates and tubular members are for use in a 41-spool wire-stranding machine. They form an assembly 105 ft long, 3 ft, 8 in. high, and 3 ft, 5 in. wide, weighing 37,055 lb. The greater part of the assembly was produced by welding.

If you are a builder of machinery—any kind of machinery, large or small—it will pay you to look into the possibilities of Bethlehem Weldments.

We have had years of experience in turning out all kinds and sizes of weldments, and our shop is well equipped for bending, forming, flame-cutting and stress-relieving operations.

If you'd like to discuss weldments in detail, call in a Bethlehem man by contacting the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

CHECK THESE ADVANTAGES OF BETHLEHEM WELDMENTS

EXCESS WEIGHT ELIMINATED

With Bethlehem Weldments, excess weight and unduly large sections are eliminated without any sacrifice of rigidity. This reduction in weight saves you money by reducing the cost of the finished machine.

VERSATILITY

Whether you need simple parts or intricate assemblies, Bethlehem Weldments fill the bill. They can be made in a complete range of sizes.

FREEDOM OF DESIGN

The steel used in Bethlehem Weldments can be bent, pressed or otherwise shaped prior to welding, without harm to its physical structure.

CAN BE COMBINED WITH FORGINGS OR CASTINGS

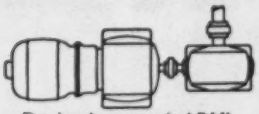
Although Bethlehem Weldments are often used alone, they can be combined effectively with either forgings or castings.

BETHLEHEM WELDMENTS

BETHLEHEM STEEL

Ask yourself these speed reduction questions . . .

1 Do I want high-ratio reduction with right-angle takeoff?

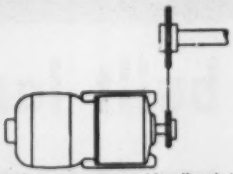


Drawing shows motorized P.I.V. variable speed and worm gear drives direct-coupled.

Then your answer is a LINK-BELT Worm Gear Drive

Reduction ratios: 3.1:1 to 8000:1
Torque: 1,400 to 123,000 in. lbs.
Output shaft rpm: 0.22 to 564

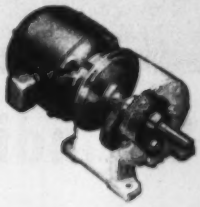
2 Is space at a premium?



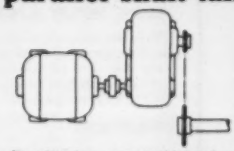
Drawing shows gearmotor with roller chain drive.

Then your answer is a LINK-BELT Gearmotor

Reduction ratios: 6.2:1 to 292:1
Hp range: 1 to 50
Output shaft rpm: 6 to 280



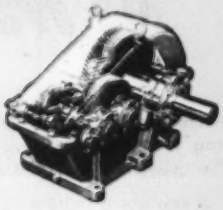
3 Will I need high hp capacity with parallel shaft takeoff?



Drawing shows motor with herringbone gear and roller chain drives

Then your answer is a LINK-BELT Herringbone Gear Drive

Reduction ratios: 2.84:1 to 318:1
Hp range: ½ to 1000
Output shaft rpm: 2 to 600



Yes, LINK-BELT builds all 3

WHATEVER factor governs your speed reducer selection—ratio, space, shaft position, shock loading—you can get the exact answer to your needs from Link-Belt's complete line of enclosed gear drives.

For Link-Belt builds a full range of sizes and ratios in all three types—Helical, Herringbone and Worm. When a Link-Belt power transmission engineer analyzes your conditions, he can recommend the specific drive to meet your specialized requirements.

For complete information, call the Link-Belt office near you.

LINK-BELT

ENCLOSED GEAR DRIVES

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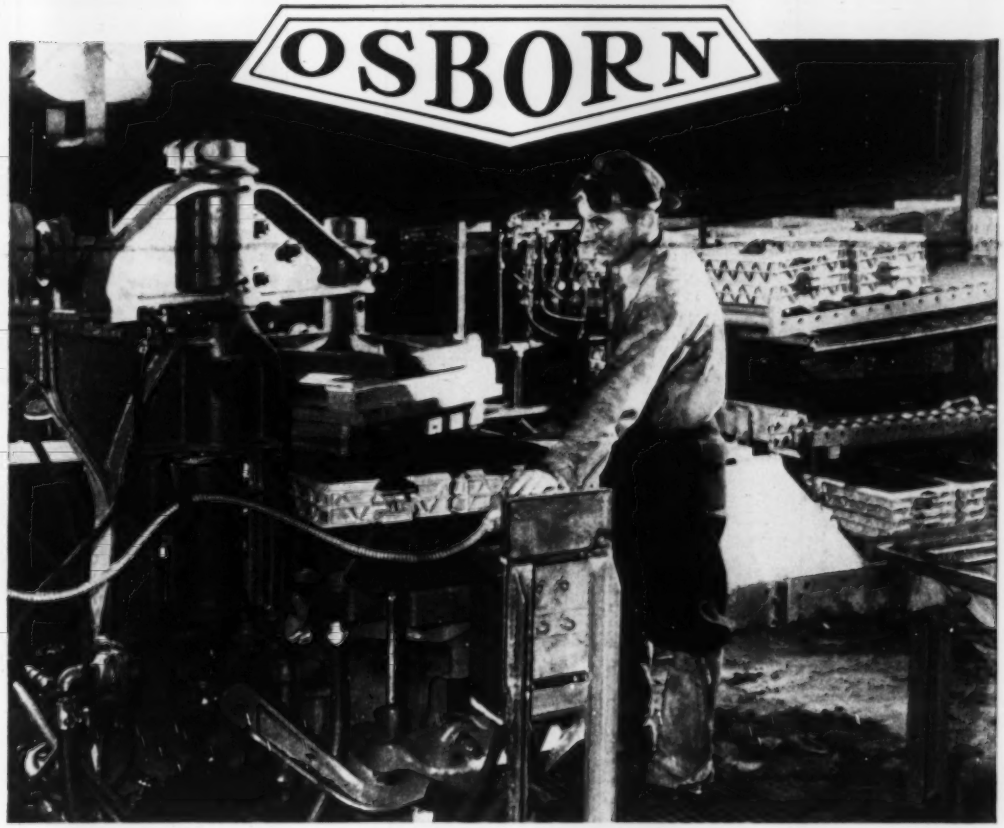


Osborn's automatic machines ... cut foundry costs!

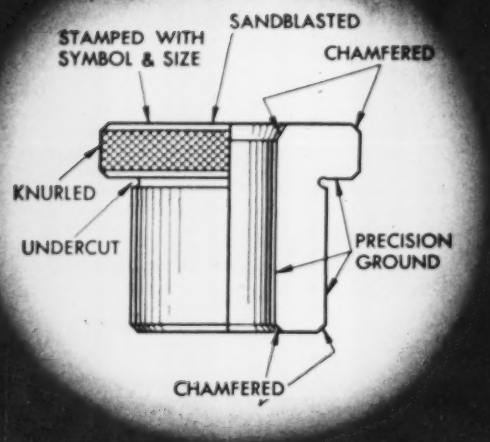
MORE OUTPUT . . . over 80% increase in operating efficiency. Less operator fatigue. Uniform quality production, hour after hour. These and other cost-saving benefits are reported by foundries using Osborn automatically controlled, molding machines and core blowers.

In the operation above, the workman simply loads the machine and presses a button. The machine does the rest . . . does it automatically. While the machine goes through its pre-set time cycle, the operator is free to set cores, to inspect completed molds or do other essential work in the production of molds. And there is less scrap due to molding. Less operator training is needed for automatically controlled machines.

Automatic controls are available on many different types of Osborn molding machines and core blowers. A factory-trained foundry specialist near you will gladly show how you can benefit. Call or write *The Osborn Manufacturing Company, Dept. 636, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Molding Machines

A COMPLETE LINE OF FOUNDRY MOLDING MACHINES . . . CORE BLOWING MACHINES . . . INDUSTRIAL BRUSHES



THE INSIDE STORY OF EX-CELL-O DRILL JIG BUSHINGS

Here are a few good reasons why Ex-Cell-O Drill Jig Bushings last longer and perform better:

1. Premium grade tool steel is selected for wear resistance and heat treated to 62-64 Rockwell "C".
2. Every bushing must measure up to Ex-Cell-O precision standards, as well as to A.S.A. standards.
3. High finish is ground on inside and outside diameters, and *under the head* for perfect bearing.

Take a tip from the country's largest users of drill jig bushings. Order from the convenient Ex-Cell-O Catalog.

To satisfy the needs of your purchasing and engineering departments be sure to have an adequate supply of Ex-Cell-O Bushing Catalog, Bulletin 35371. Ask for the copies you need.

XLO

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MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS
RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT
AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

51-32

STEEL

The Weekly Magazine of Metalworking

VOL. 130 NO. 2 JANUARY 14, 1952

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Editorial and Business Staff—Page 10. Advertising Index—Page 122. Editorial index available semiannually. STEEL also is indexed by Engineering Index Inc., 29 West 39th St., New York 18.

Next Week ... **Laboratory Tests Select Best Blast Cleaning Method** ... **Tin Plating Advances Save Metal** ... **Clad Steel Bullet Jackets Conserve Copper & Zinc**

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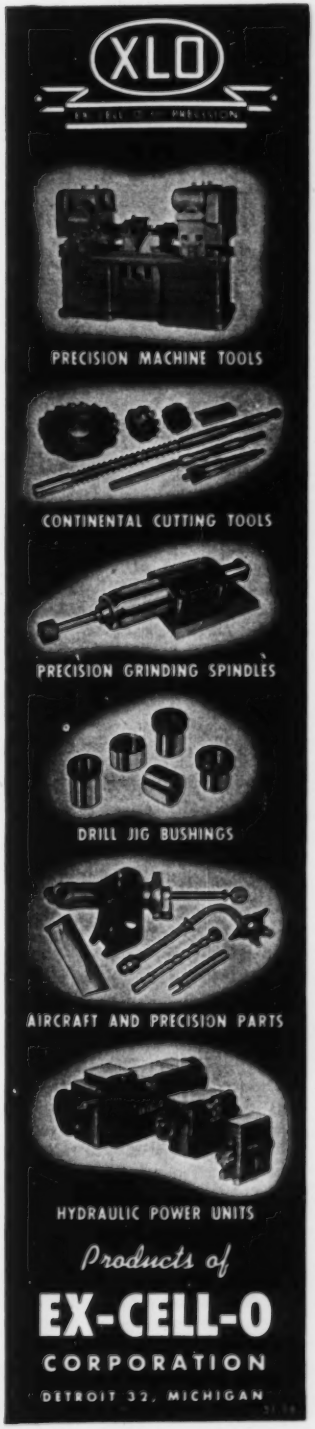

Tell Us Your Troubles

ONE OF OUR PRODUCTS— OR ONE OF OUR MEN— MAY SUPPLY

the Cure!

Sticking out our neck, asking for trouble, has shown us what the metal working industry needs, and led the way to bringing the various PELRON Chemicals for industry up to their position of leadership.

Cutting oils, drawing, forging, grinding and cleaning compounds to meet the varying and imperative demands of today's production methods, are the result of tackling, and licking, problems that have plagued our customers.

What has solved others' problems could be the solution to yours— it's worth looking into, isn't it?

In foundries, machine shops, finishing departments — in short, throughout the metal-working industry, results are improved, time and materials are saved, machinery, equipment and tools are given increased life, by the use of various PELRON Chemicals for industry.

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Behind the Scenes...

Primed To Go

The editors are all raring to go these days, since they're all steamed up after an editorial conference ten days ago. The staff from all over the U. S. met in Cleveland Jan. 3 and 4 to appraise the job done in 1951, to make plans for improving editorial coverage still more in 1952 and to lay the groundwork for editorial policies over the next several years.

Titled

The difficulties with her title as female draftsman that Mary Kay Smith of Armco Steel Corp. reported on in our Dec. 24 issue has brought forth several suggestions.

John Sears, executive secretary of American Gear Manufacturers Association, believes that she should be called a "draftsfem." F. B. Cannon of Copperweld Steel Co., says she might be called a "draftseuse," which would give nice French chic to the title. Surpriringly, most of the suggestions about female titles for occupations that historically have been filled by men come from men, not the women who you would think would be the most concerned. Some Freudian implication there, no doubt.

Garage Trouble

A Mansfield, O., matron gave to her husband as a Christmas present one of those electronic gadgets whereby a button pressed in the car automatically opens the garage door. The husband was delighted with it. It was installed in time the day before Christmas and he spent hours trying the thing out.

All went well until late Christmas eve when not a creature was stirring, not even a mouse. Suddenly, the couple were awaked out of a sound sleep by a rumbling sound in the garage. Our man threw open the window to see what was the matter, found that his garage door had mysteriously opened although no one was in the car. Once more that night the same thing happened, and three times Christmas day the door rolled open in an eerie manner. The day after Christmas the service people were called but could find nothing wrong. The door opened when our man pressed his button, yet it also opened at odd intervals day and night without apparent benefit of the button.

Finally, the service people spent two whole days watching the door and came up with the answer. Planes flying overhead were on the same wave length as the door and were activating the mechanism. The wave length was changed and now all is well.

Far-Flung Well-Wishers

We're still receiving Christmas cards, the latest is from S. Sakai, president of Kanto Special Steel Works Ltd., Japan. It shows a snow-covered Christian church built in the Japanese style of architecture. The English printing on the card is in Gothic type, but the flavor of the season's greeting is American in wording.

Another fine card has come from Sweden, but try as we can we have been unable to decipher the signature.

Puzzle Corner

In our Dec. 31 puzzle about the potatoes, our old friend, M. S. Bailey of Machine Products Corp., came in first with the answer—15,621 spuds. In the Dec. 24 problem about the will, Lou A. Scholtz of East Palestine, O., led the parade with this answer:

There being no irrevelant statements, deceased must have worn a green tie some place and some time. We know of only one place and one time, so he wore it at Oxford in March, 1920.

Ownership of the umbrella can be established only if the first legatee did lend it, which very neatly puts Smith in his place.

Smith, having seen deceased wear that tie, cannot choose before Jones. So Jones cannot choose last, nor can he choose second if the final statement is to be relevant. Brown must choose before someone, so poor Smith was first in love and last in books. Jones, Brown and Smith is the order, but did Jones get his umbrella back?

Here's this week's puzzle: A man goes to a store and borrows as much as he has and then spends $20. He repeats that at a second and at a third store and then has no money left. How much had he at the beginning?

Shrdlu

(Metalworking Outlook—Page 17)

Wellman will build it

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Gas Producer Plants
Charging Machines
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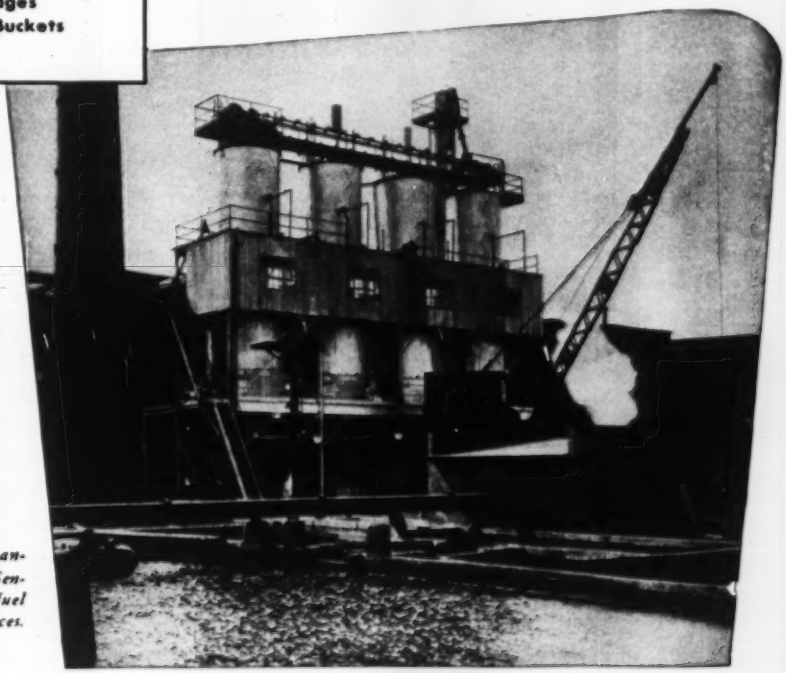
Built exclusively by Wellman

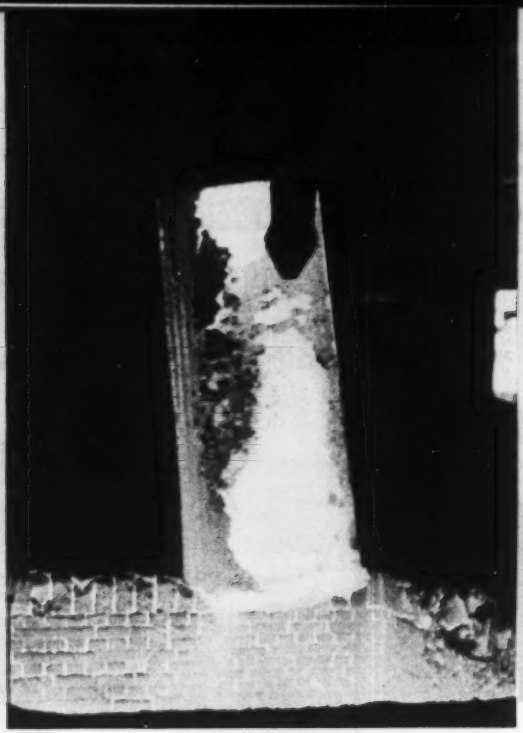


Four 10 ft. Wellman-Galusha Clean Gas Generators supplying fuel for steel mill furnaces.

● Only Wellman builds the Galusha Clean Gas Generators that so ideally meet your requirements with efficiency and economy. These generators combine, in a *complete* machine, the rotary grates, ample fuel storage bin, and provisions for generating the steam required for making the gas. Even the lowest-priced grades of Anthracite and coke can be satisfactorily gasified.

THE WELLMAN ENGINEERING COMPANY

7029 CENTRAL AVENUE • CLEVELAND 4, OHIO



Ready to Roll!

● Ingot of invincibility! From the hot mass of this semi-molten metal will be rolled the weapons for our national defense . . . weapons to protect the way of life we cherish. And, we hope, that the future will find the output of this soaking pit going into refrigerators, bathtubs, and structural steel for the expansion of industry and added comfort to our daily lives.

The refractories industry has kept step with the steel industry in the amazing advance of production. General Refractories has constantly increased its capacity to meet the new demands. Today it offers industry the facilities of 43 mines, 29 plants, 18 sales offices and 200 distributing agencies.

Here, in this soaking pit, you'll find

GENERAL REFRACTORIES

GENERAL REFRACTORIES COMPANY
PHILADELPHIA

specially designed silica brick, fireclay brick, basic brick, high alumina brick, and Grefco plastic chrome ore, castables and mortars. But wherever else you look in the steel mill . . . blast furnace, open hearth, cupola . . . you'll find many another application for Grefco products.

And . . . beyond producing more and more of today's refractories products . . . General is engaged in an exhaustive research compaign to make possible even better refractories. In the world's most modern research laboratories, constant experimentation is carried on. All to the end that industry—steel, chemical, paper, glass—may count on General for a complete refractories service!

A Complete Refractories Service

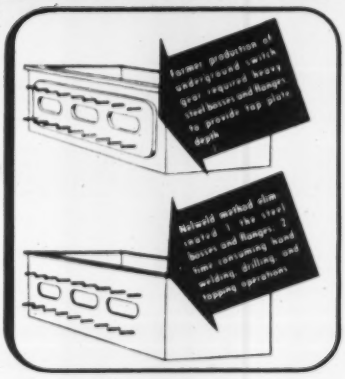
NELWELD CASE HISTORY IN POWER DISTRIBUTION EQUIPMENT

Split-second end-welding of Nelson studs on switch gear boxes, using a production jig for high-speed positioning and alignment.

A BETTER PRODUCT

Plus

- a saving in steel
- reduction in weight
- lower cost fastening


Former production of underground switch gear required heavy steel bosses and flanges to provide tap plate depth
Nelweld method eliminated the steel bosses and flanges. Time consuming hand welding drilling and tapping operations

Production of underground switch gear housings at G & W Electric Specialty Company, Chicago, formerly involved the hand welding of heavy steel bosses and flanges to provide tap depth for the installation of cover plate studs. Now, improved design and substantial production cost-savings have been obtained through use of the Nelweld method of fastening, by which studs are simply end-welded to the face plates of the housings.

Product weight and metal costs have been reduced through the elimination of bosses and flanges. Material handling has been simplified. Slow drilling and tapping operations have been replaced by the split-second welding of Nelson granular flux-filled studs, providing a big reduction in production time and costs.

If you are now using outmoded methods of fastening to steel, find out how Nelwelding can help speed production, reduce material handling, improve product quality and lower your costs.

Full information and Nelweld Engineering Service are readily available. Simply contact your nearest Nelson representative or write Dept. S-3, Lorain, Ohio.

Faster it Better...at Less Cost, with NELWELD

NELSON STUD WELDING

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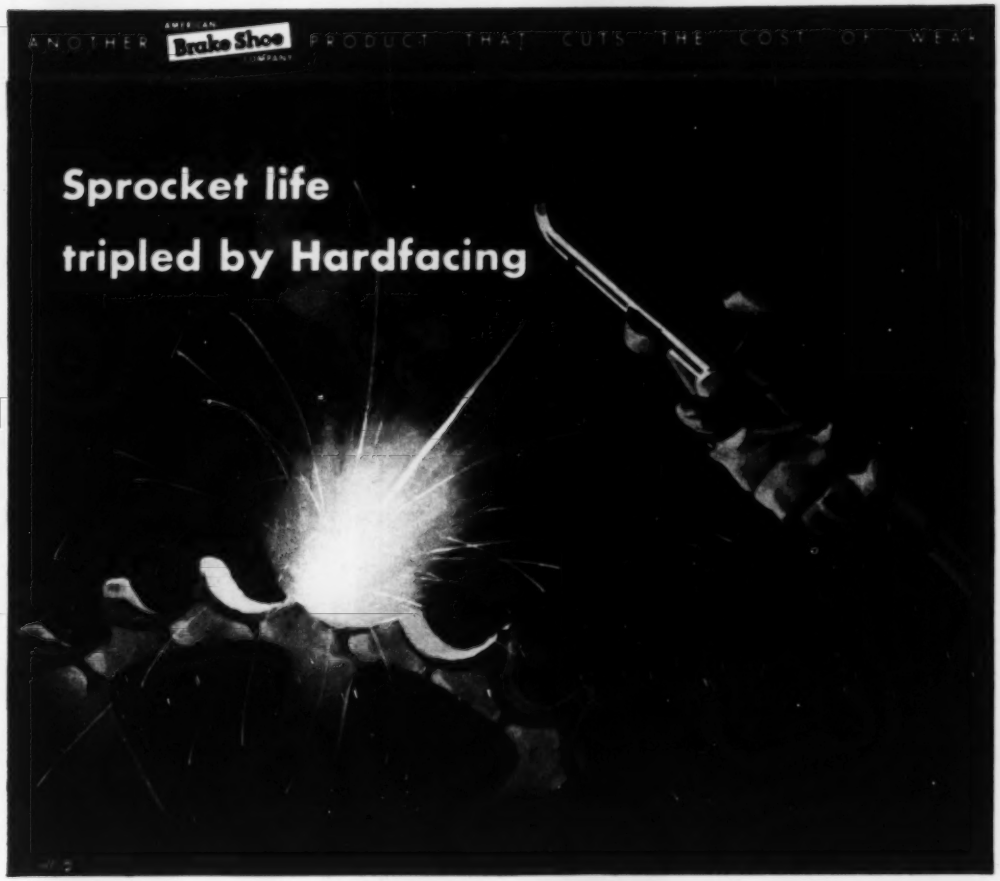

Repair instead of replace . . . on the job . . . at less cost

The sprockets that give 20-ton bulldozers their herculean push take a hard fisted beating as they slam into the track that moves the monster. Add to this destructive action, the gouging and cutting of sharp edged sand and stone, and you have wear at its worst.

Hardfacing . . . the laying of a hard, tough, wear-resistant metal surface on a softer base metal, by gas or arc welding . . . is a cost-cutting answer to this wear problem. It makes parts hard, yet tough, to resist the wear of impact, abrasion, corrosion and heat.

Amscoating is a method of hardfacing that often reclaims such worn out parts for less than original cost. It lengthens the life of old or new parts often beyond original service. Amscoating can be done in the field and on the job quickly and cheaply by any competent welder.

Amscoating is based on the know-how derived from thousands of practical field applications, with directly traceable savings in lower maintenance and replacement costs, and fewer shutdowns. Our Amsco engineers will welcome the opportunity to apply their experience to your hardfacing problem. Write Department G for literature about Amsco Welding Products.

AMERICAN Brake Shoe COMPANY
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10 Divisions of American Brake Shoe Co. produce wear-resisting parts in 33 American and Canadian plants.
AMERICAN BRAKEBLOK DIVISION • AMERICAN FORGE DIVISION • AMERICAN MANGANESE STEEL DIVISION
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KELLOGG DIVISION • NATIONAL BEARING DIVISION • RAMAPO AJAX DIVISION • SOUTHERN WHEEL DIVISION

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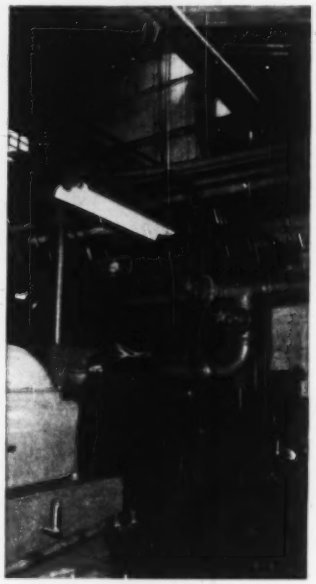
You Get Trustworthy Liquid or Gas Cooling With Great Cooling Water Savings from the NIAGARA AERO HEAT EXCHANGER

● You can cool air, gas, water, oils, chemicals, electric and power and process equipment, engines, mechanical processes with lower cost and really accurate control of temperature with the Niagara Aero Heat Exchanger.

You are assured of uniform, constant production and quality from any process . . . steady, reliable operation . . . lower cost for more dependable cooling. You can have closed system cooling with freedom from scale, dirt, corrosion and maintenance troubles. You can accurately cool more than one type of liquid with one machine.

The Niagara Aero Heat Exchanger uses atmospheric air to cool liquids and gases by evaporative cooling. You can remove heat at the rate of input to keep accurate control of gas or liquid temperature. You can put heat back into the system to save the losses of a "warm-up" period or to equalize the effect of load variations.



Great savings in cooling water and savings in piping, pumping and power return the cost to you quickly. The Niagara Aero Heat Exchanger can save you approximately 95% of your cooling water cost. Write for Bulletin 96.

NIAGARA BLOWER COMPANY

Over 35 Years Service in Industrial Air Engineering

Dept. S, 405 Lexington Ave. New York 17, N. Y.

Experienced District Engineers in all Principal Cities

LETTERS
TO THE EDITORS

OOPS!

Seldom do I run across a mis-spelled word in your columns but I question the use of "ll" in the spelling of wherewithal, Dec. 4, p. 37.

J. F. Findlay
El Potosi Mining Co.
El Paso, Texas

● *Too much "l".*

Who and Where Department

Where can we get the Standard Industrial Classification Manual of the Department of Commerce? We want to use it in connection with the analysis of U. S. Metalworking on which you published a brochure in July, 1951.

Harold B. Reid, sales manager
Wallace Barnes Division
Associated Spring Corp.
Bristol, Conn.

● *Try your nearest Department of Commerce field office, or write the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C.*

Which issue of STEEL carried your article "Welding Substitute Steels" by Harold Lawrence?

A. B. Tesmen
Tempil Corp.
New York

● *See page 60, Aug. 31, 1942.*

Know-How for Export

Will you please send me copies of your articles on "Know-How of Jet Engine Manufacture" (Sept. 10, p. 90) and "Critical Metals Slashed in Television Circuits" (Apr. 2, p. 78).

Nellie Halpern
Netherlands Embassy
Washington

Thanks to STEEL

Your interest in helping with the success of the World Metallurgical Congress, including the session in Washington, has been greatly appreciated in the past year.

John W. Barnet, director
International Technical Services
Washington

For Ready Reading

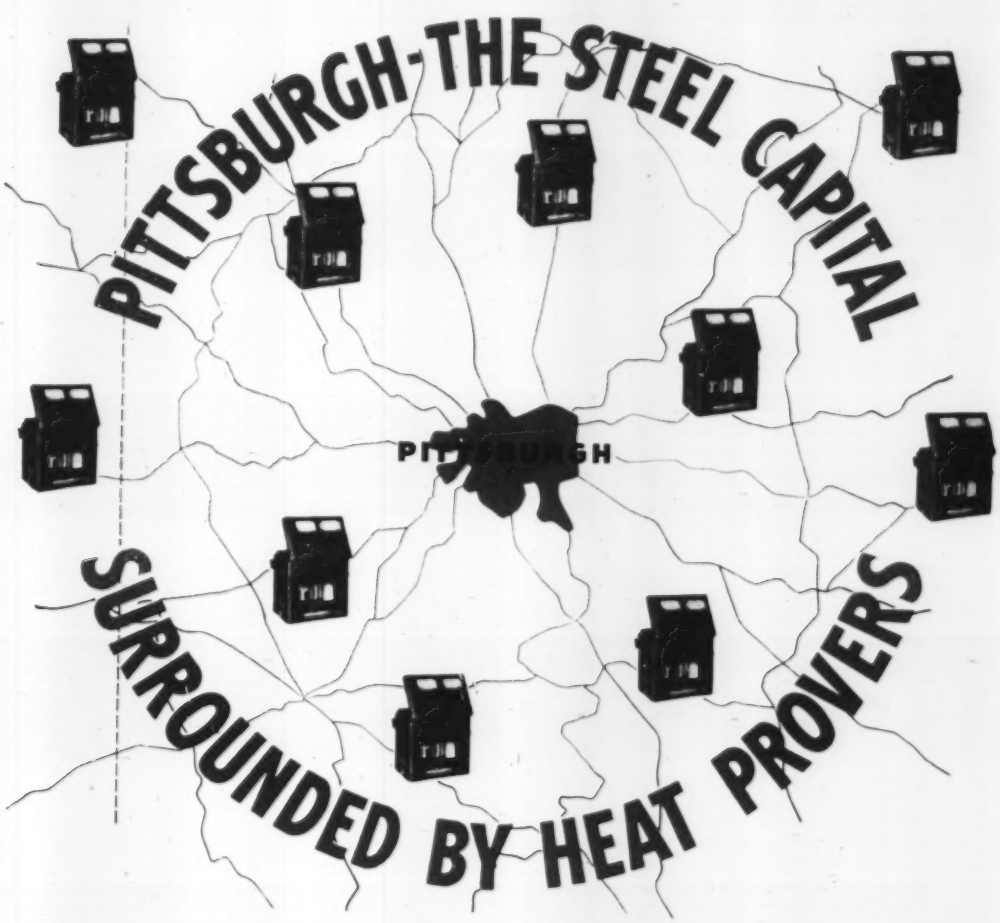
Will you please send us a copy of "Metallography of Alloys of Titanium with Oxygen, Carbon, and Nitrogen" (Nov. 19, p. 88)?

L. W. Ingold, sales manager
Pittsburgh Forgings Co.
Coraopolis, Pa.

We would appreciate tear sheets of the article, "Cerium and Lanthanum Improve Hot Workability of Stainless" (Dec. 10, p. 88).

T. V. Simpkinson
Physical Metallurgy Division
Department of Mines and Technical Surveys
Ottawa, Ontario

● *They're on the way.*



When your eye is on Pittsburgh—and three dozen towns in its orbit—you're spotting scores of furnace operations regularly checked by Cities Service Heat Provers. Here, where they know all kinds of furnace instruments, and where high efficiency is most urgent today, the application of Heat Provers by Cities Service is increasingly valued.

It takes the Heat Prover to read simultaneously for oxygen and combustibles, measured direct by actual gas analysis. And the Heat Prover's continuous rapid sampling reveals effects of furnace adjustments at once. The Heat Prover frees you of maintenance too, because it's *not an instrument you buy, but a Service we supply.* Learn how it can raise productivity for you . . . in iron, steel, ceramics, glass, cement or any other furnace operation. Write CITIES SERVICE OIL COMPANY, Dept. A21, Sixty Wall Tower, New York City 5.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Let us prove this prophet false

"We shall force the United States to spend itself into destruction."

These are the words of Lenin, father of Russian Communism. Quoted from page 191, volume xxi, of his Collected Works, they were printed recently in a metropolitan newspaper.

This is the announced goal of the Politburo, and it is the direction in which many patriotic citizens fear we are headed. For example, Congress has just appropriated $87 billion to be spent during 1952, and enacted taxes estimated to produce only $71 billion. The deficit is to be added to our national debt, already $259 billion; and this deficit will depreciate the national currency by another $16 billion.

Part of this stupendous appropriation is to rearm ourselves and the free world against Communist attack. But what about the rest of our spending?... Let us also be realistic. It is time for us as a nation to pause, reflect and consider well. We can do three things to avoid national bankruptcy:

1. Eliminate every non-essential federal expense.
2. Provide taxes to pay all obligations as we go.
3. Pay off some of our national debt every year.

Let every citizen who believes in preserving our nation from the economic termites within, as well as from the announced enemy without, become an active worker to prove the Russian prophet false.

YOUR SCRAP IS NEEDED — YOUNGSTOWN

The Youngstown Sheet and Tube Company

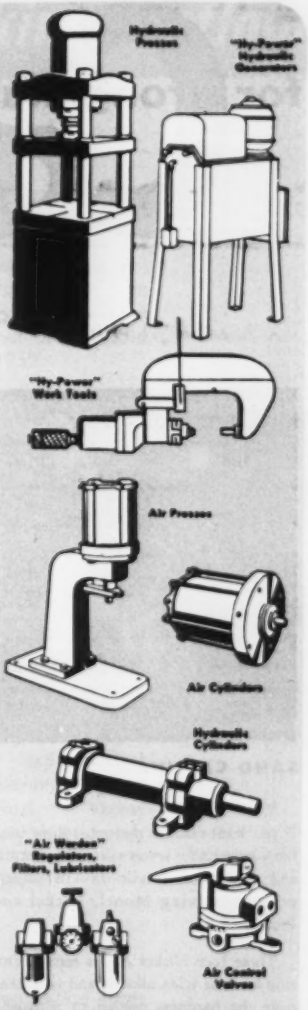
General Offices--Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York

MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment

HANNIFIN HELPS

EVERY DESIGN AND TOOLING ENGINEER SHOULD HAVE THESE HELPFUL HANNIFIN BULLETINS



1 Hydraulic Presses—Bulletins 130-34-35

These Hannifin Catalogs should be a "must" in every machine tool file. Contain complete engineering data and specification tables on 75 standard models of forcing, straightening, forming, bending, and moulding presses. 1 to 150 tons.

2 "Hy-Power" Hydraulics—Bulletin 150

Fully explains the high-pressure "Hy-Power" Generator and the many ways it powers "Hy-Power" Work Tools for fast, low-cost riveting, punching, pressing, forming and bending operations. Portable or stationary units in capacities from 5 to 100 tons (more in multiple).

3 Hydraulic Cylinders—Bulletin 110

It's easy to get the right cylinder for even the most special job when you use Hannifin's big 52-page handbook on Hydraulic Cylinders. 12 standard bore diameters, 1" to 8". 11 standard mounting styles. More than 65 mounting combinations.

4 Air Cylinders—Bulletin 210

A complete catalog on Hannifin Pneumatic Cylinders with a wide range of mounting styles—many combination mountings—12 sizes—any length stroke—1" to 16" bore—plain or cushioned types. Engineering data, design and construction features. A handy reference.

5 Air Control Valves—Bulletins 57-W, 230-36-40-41

Hannifin makes all types of control valves for single or double-acting air cylinders: "Packless" rotary disc type. "Effortless" sliding disc type. "Directair" electric disc type. Quick delivery.

6 Air-Operated Presses—Bulletins 250-51-52

Hannifin Air-Operated Presses for many assembly operations including staking, punching, press-fitting and light forming, and riveting. 59 different models—½ to 18 tons for bench of floor mounting. Hand, foot or push-button controls.

7 "Air Warden" Pressure Regulators, Filters, Lubricators—Bulletins 1005-8-9-10

Pressure Regulators—primary pressures to 150 p.s.i. Reduced pressure—5 to 125 p.s.i. Filters and lubricators—for pressures to 150 p.s.i. Combination units. The finest protection possible for air-operated equipment.

8 NATION-WIDE HANNIFIN SERVICE

Hannifin factory-trained field engineers are conveniently located in leading industrial centers. Their practical recommendations will meet your requirements or special specifications. Consultation is part of our service.

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Please send Bulletins I have checked.

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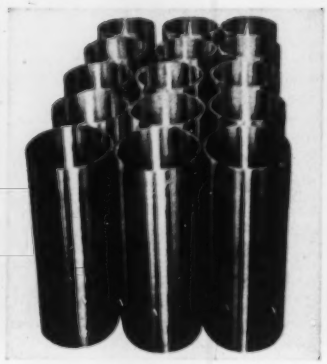
City.....*State*.....

for strong, hard, heat- and corrosion-resisting Castings

—consider MONEL, NICKEL and INCONEL

SAND CASTINGS



CENTRIFUGAL CASTINGS

PRECISION CASTINGS

If you want castings that must show long life—even under severe corrosive, thermal and mechanical conditions—investigate problem-solving Monel, Nickel and Inconel.

These Inco Nickel Alloys resist corrosion by most acids, alkalies and salts; they have the hardness needed to withstand abrasive and erosive attack; they are strong at high temperatures, at low temperatures.

"S" Monel's high hardness and resistance to galling make it a favorite material for all wearing surfaces where erosion is a factor. "H" Monel is used where better ductility is required on mildly abrasive applications.

Inco will supply the castings to your order from our own foundry at Bayonne, N. J. This foundry is maintained as a service to users of Nickel alloys.

Here, your order gets *double* expert attention. Attention by expert foundrymen; attention by foundrymen who are experts in casting high-Nickel alloys.

At present much of Inco's production is being diverted to defense and you may not be able to get immediate delivery. However, our expert foundrymen are always ready to help you with your special casting problems, whether they be sand, centrifugal or precision.

Pass the details along to Inco at the address below. Let us work it out with you to see how economically it can be solved by use of high-Nickel alloys.

PRECISION CASTINGS ARE PRODUCED IN THESE METALS

Monel®
"H" Monel
"S" Monel
Nickel
Inconel®
Ni-Hard®
Ni-Resist®
Stainless Steels
SAE, AISI, NE Steels
Tool Steels
Copper-Base Alloys
Cobalt-Base Alloys

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THE INTERNATIONAL NICKEL COMPANY, Inc., 67 Wall Street, New York 5, N. Y.

Think of Inco for Castings in durable metals

January 14, 1952

Defense Phase Shifts

Production of actual military items—rather than the machinery to make them—will distinguish the new year. Airplane output should increase over 1951 levels by about 115 per cent. Electronics manufacture is due to rise about 268 per cent. The machine tool industry will be operating at more than double the shipment rate of $619 million achieved in 1951. Shortages of basic materials will be most acute during the second and third quarters of 1952, but the situation should be better—especially in steel—in the closing months of 1952.

Cool Reception

President Truman's State of the Union Message met a cool reception, even from many Democrats. On three subjects of particular interest to industry—taxes, price control and the Defense Production Act—the President asked for tighter legislation. Expect at least a status quo on all those matters. The Defense Production Act may even be considerably emasculated when it comes up for extension next summer.

Taxes: Full Impact in 1952

Taxpayers will pay $55.5 billion in taxes to support the federal government in 1952, compared with about $50 billion in 1951. Commerce Clearing House points out that in the coming year you will feel the full impact of the three federal boosts voted since the start of the Korean War. The first raise came with the Revenue Act of 1950, increasing the take an estimated $6.1 billion. Next, the excess profits tax on corporate income enacted last January but dating back to July 1, 1950, raised revenue by $3.9 billion. The 1951 law of last October will bring in an additional $5438 million.

Steel Prices

Officially, at least, OPS is doing nothing about the suggestion from steel companies that it study steel prices concurrently with WSB's investigation of the wage case. But some behind-the-scenes work is going on because the odds are that a $7.50-per-ton price boost will be allowed to partially offset a 15-cent wage grant (p. 25). The companies involved in the dispute formed a co-ordinating committee to expedite presentation of the industry's case in hearings that opened Jan. 10.

Small Firms Exempt from Wage Rules?

Watch for pressure on the Economic Stabilization Agency to exempt small business from wage regulations. The argument is that such an exemption would relieve little companies from the plague of labor

Production Engineering News—p. 53 *The Market Outlook—p. 93*

pirating. The House Small Business Committee is advancing the proposal.

Financing Headaches

Financing of defense business is becoming an increasingly severe headache, particularly for small business. Many firms can't get a contract without showing adequate financial background and can't get financing without a contract. One cause of the problem is the slowness with which government loans are approved. In the works is a plan to delegate U.S. loan authority to the regional Federal Reserve Banks, so the process can be speeded.

On the Matter of Prose

Complaints are mounting about the turgid, legalistic prose in which government regulations are written. Washington planners will fight a long fight for the legal wording, but they may compromise by providing interpretative prefaces, written in a more colloquial style, to the voluminous regulations. Most of the complaints concern the pricing regulations.

Railroads Study Rates

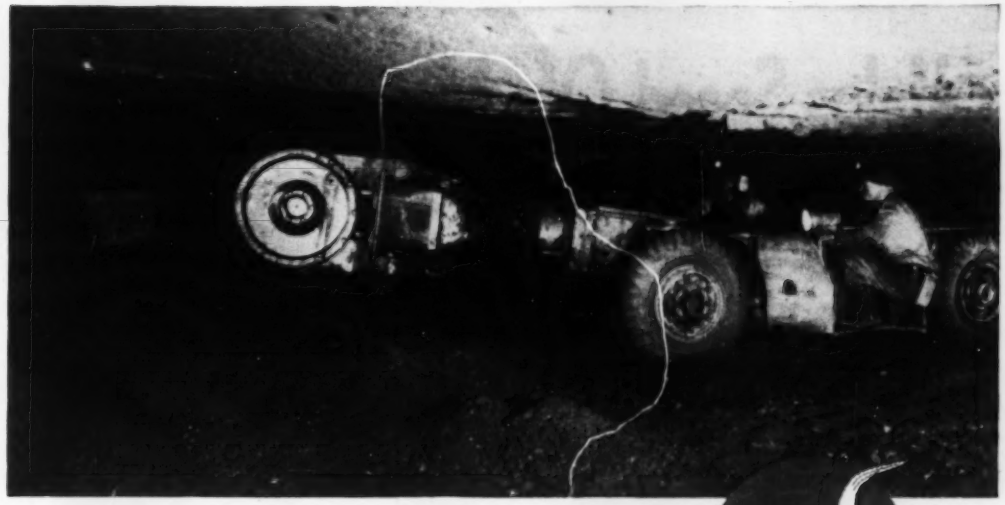
The railroads are considering asking for a new freight rate increase in addition to the pending request. The new boost would be sought to cover $120 million in wage increases that became effective Jan. 1 under cost-of-living escalator clauses in labor contracts. Railroad statisticians now figure that, even if the full 15 per cent originally asked for were okayed, the added revenues on the basis of current 1952 traffic forecasts would fall short by about $15 million of offsetting added costs.

Straws in the Wind

U. S. Steel Corp. has filed its corporation papers to operate in British Columbia . . . Philco Corp. arranged a $40 million V-loan to finance its rapidly increasing defense production of electronic equipment and missiles . . . Aluminum Co. of America's $300 million expansion program, due for completion early next year, will increase Alcoa's aluminum-producing capacity by 205,000 tons, or 55 per cent annually . . . Virtually no industrial or commercial construction starts will be permitted in the second quarter . . . A proposed order would permit machine tool builders to use a Z-2 rating to get warehouse steel.

What Industry Is Doing

Youngstown and Inland Steel officials are adding their voices to others in predicting that we'll have plenty of steel late this year (p. 26) . . . NPA will hold clinics in 16 cities beginning this week for companies who have been cut back 65 per cent or more on copper and aluminum (p. 27) . . . You should be able to get nearly all the bearings you need in 1952 (p. 28) . . . There's packaging aplenty to help solve your shipping problems this year (p. 29) . . . Industry wants more machine tools, and better ones, too, an American Society of Tool Engineers survey shows (p. 35) . . . Metalworking helps to bring in more oil (p. 36).



The Steel that took the cussing out of changing an "Alligator's" Teeth

• Deep in the coal mines, mechanics had the knuckle-busting job of loosening the worn set-screws that hold coal-cutting bits in the endless chain of mechanical coal-mining machines . . . or "alligators". The grinding abrasion of coal and rock quickly wore off the square heads to round heads.

The Bowdil Company makes most of the cutter chains used on leading makes of coal-mining machines. They asked Republic Steel for a solution to the problem of the round heads on the "alligator".

A Republic Field Metallurgist recommended that Bowdil switch to a Republic *Carbon-corrected* Cold Drawn Alloy Steel Bar for the set-screws. They did . . . and there's been less cussing in the coal mines . . . plus a great reduction in the amount of high-priced time wasted in trying to get a grip on worn set-screws.

Carbon-correction produces long-wearing qualities in the square alloy steel bars right out to the corners . . . prevents the corners of the stock from turning up soft while the center has the desired hardness.

May we tell you more about Republic *Carbon-corrected* Cold Drawn Alloy Steels? And how Republic Three-Dimension Metallurgical Service helps manufacturers work these steels into their production? A letter will bring the Republic Field Metallurgist to call.

Republic Carbon-corrected Cold Drawn Alloy Steels make the square heads of these set-screws tough right out to the corners to withstand wear longer without rounding off.

REPUBLIC STEEL CORPORATION

Alloy Steel Division • Massillon, Ohio

GENERAL OFFICES • CLEVELAND 1, OHIO

Export Department: Chrysler Building, New York 17, N.Y.

Republic ALLOY STEELS

Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Plates, Pipe, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Helps Speed Ore Movement

In 1912,
fifty steel mill
men came to Cleveland to witness the first dynamic lowering hoist control when EC&M demonstrated that loads could be safely handled and the expensive-to-maintain mechanical load brake could be eliminated.

THIS TYPICAL EC&M CONTROLLER (and a duplicate) will soon be placed in service to control the hoisting, lowering, opening and closing of a two-motor bucket hoist on an ore bridge.

For this and similar crane-hoist applications, EC&M Control Apparatus and Control Engineering have earned a reputation for quick, easy manipulation of material handling equipment. Less tiring to the operators, this EC&M equipment enables them to maintain high output *continuously*. And maintenance men know that magnetic controllers using EC&M LINE-ARC Contactors are unequalled for low maintenance.

EC&M Crane Controllers are fast and safe, too.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

A Great Service

In his state-of-the-union message, President Truman called for more sacrifices in order to step up preparedness, emphasized strongly the desirability of extending the Point Four program and renewed demands for expanding government paternalism at home. Every one of his recommendations fits nicely into the Truman philosophy, which is that there is almost no limit to what the federal government should undertake at home or abroad.

As we listened to his message and later read its text carefully, we wondered what kind of a state-of-the-union message would have been delivered if any of the several aspirants for the presidency had been in Mr. Truman's place last Wednesday. In what manner would it have been altered if it had been authored by General Eisenhower, Senator Taft, Harold Stassen, Governor Warren, Chief Justice Vinson, Senator Kefauver or other present or prospective candidates?

It is certain that not one of these hopefuls would have included all of the measures recommended by Mr. Truman. Even those candidates who favor the "fair deal," "new deal" or "welfare state" in principle would balk at espousing many of Mr. Truman's projects. Conservative candidates of either party would tone down the paternalistic program and would seek to find practical limits to which this nation can engage in international affairs. Not one of the candidates, regardless of political faith, would condone reckless spending to the extent Mr. Truman has.

The truth is that by an odd chain of circumstances Mr. Truman first inherited and then further developed political alliances which have made it possible and sometimes necessary for him to do things that no new occupant of the White House would want or dare to do. A break in this chain is long overdue. A new President, with freedom to select new advisers, form new alliances and focus debate on new approaches to our most difficult problems would lift the nation out of its trance of frustration.

Mr. Truman could render the nation a great service by declaring that he is morally bound by the 2-term limitation and therefore declines to run in 1952.

E. C. Shaner

EDITOR-IN-CHIEF

TO BUY MORE IN 1952: An important customer of the metalworking industry is anxious to buy more in 1952 than in any previous year. This customer is the energetic oil and gas industry, which is spurred to new heights of activity by the world armament race and the Iranian oil crisis. Oil and gas companies expect capital expenditures to touch $3 billion in

1952. About 60 per cent will be for basic production, 14 per cent for transportation, 16 per cent for refining and the remainder for marketing.

The heavy emphasis on production reflects the need of more "wild-catting." Gas and petroleum interests hope to put down 45,000 wells this year. At 44.5 tons of steel per well, this means 2 million tons of steel. When to this is added the industry's need of steel for refineries, tank cars, tankers, pipe lines and other facilities, one arrives at a total steel requirement of more than 8.5 million tons, plus a substantial market for valves, pumps, meters, and scores of other products of the metalworking industry. —p. 36

* * *

EXPECTS NEW FORMULA: While a six-man fact-finding panel in Washington is weighing the pros and cons of the steel wage and price problem, industry men are trying to guess what the final decision will be. Views as to the amount of wage increase range from 12 to 20 cents an hour, with 15 cents a popular estimate. Should 15 cents be granted, then the compensating increase in steel prices might run from $5 to $15 a ton. Advances averaging about $7.50 per ton seem to be expected.

Should increases of the order of 15 cents per hour and $7.50 per ton be agreed upon, the door will have been opened for a new round of revision of most wage and price formulas. This would provide a new shot in the arm for inflation and call for more anti-inflation correctives. —p. 25

* * *

SCRAP IS SNOWBOUND: Unfavorable weather is seriously handicapping the nation's drive for more ferrous scrap. Heavy snows have slowed the collection and shipping of scrap material to the point where steel production actually has been halted for the first time during the present period of shortage. Last week three open-hearth furnaces at Gary, Ind., and five at Pittsburgh were shut down because of lack of heavy melting steel.

While a break in the weather would help appreciably, the situation plainly calls for a redoubling of efforts to dig up more scrap. This is a task for every metalworking executive. Don't delegate it to somebody down the line. Take an active hand in it yourself. You have the authority to decide what should or should not be scrapped. See that your dormant tonnage goes to scrap dealers promptly. —p. 29

* * *

DOUBLE OUTPUT, PRICE: Shipments by American machine tool builders in 1951 totaled about $619 million, or slightly more than double the $305,550,000 in 1950. According to the National Machine Tool Builders' Association, shipments in 1952 may double last year's output and may possibly match the industry's record of $1320 million in 1942.

Whatever gratification may be gained from this impressive prospect is dimmed somewhat by two factors. One is that prices of machine tools have doubled since 1942, which means dollar volume in 1952 will represent only half as much physical volume as in 1942. The second factor is that because of the scarcity of American machine tools in relation to demand, some large users are buying European machine tools extensively. Companies such as Wright Aeronautical, Lockheed Aircraft, General Electric and Pratt & Whitney Aircraft recently purchased 1430 French, British, Swiss, German and Italian machines costing in excess of $16 million.

—pp. 35, 36

* * *

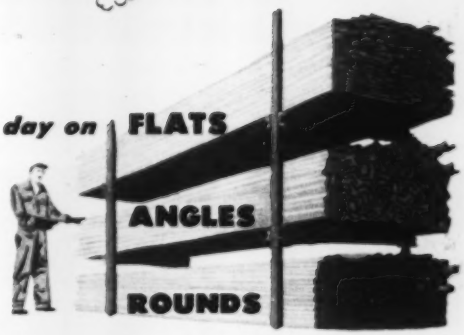
USES THERMAL SHOCK: Metal disintegration is based upon principles that were recognized and even patented almost three-quarters of a century ago, yet its possibilities are dawning as something new to many persons in the metalworking industry. Probably it is best known as a method of salvaging an assembly, forging or casting when a tap or drill has broken after expensive machining has been performed on the piece.

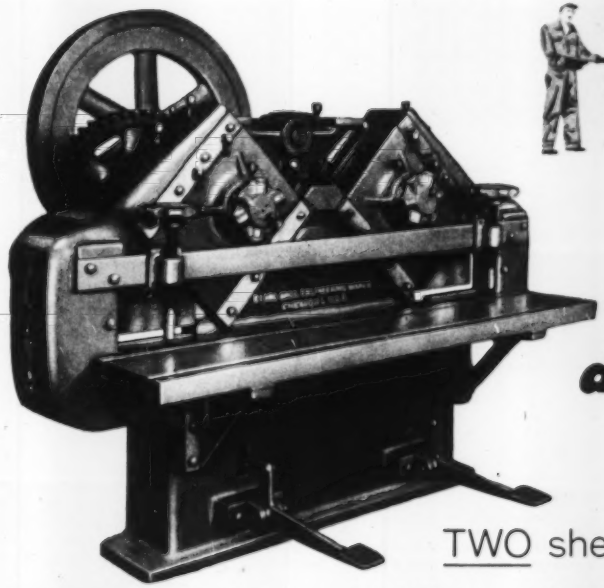
The theory of metal disintegration is that electrical current flowing through an electrode and the work causes instantaneous heating and melting of the metal below the electrode. Simultaneous injection of a coolant produces a thermal shock to the metal, breaking the metallic bond. Disintegrated particles of the metal are washed away with the coolant.

Salvage is only one of several uses of this process. It can be used in marking or etching metal and in die forming. It merits investigation. —p. 60

It's the BUSIEST machine in the shop!

...gives more cuts per day on





Kling double angle shears

TWO shears in ONE machine!

If you're using obsolete, slow-poke methods of shearing, the Kling Double Angle Shear can help you save time and money. This modern compact machine is designed for high speed, high production shearing on both long and short run jobs. Many metal fabricating plants and steel warehouses have found the Kling Shear to be the workhorse of the shop. For instance, one machine will shear round bars and bar angles on the left side while the right side can be used for structural angles and flat bars. The machine is built with the speed and power to handle the bulk of your shearing requirements. For shops with considerable mitre shearing work, Kling Double Angle Shears can be mounted on a turntable to facilitate handling. Automatic hold downs and one-shot lubrication can be furnished when desired. Sizes to handle angles up to 8" x 8" x 1½".

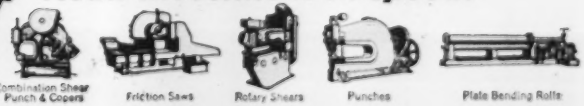
WANT TO CUT SHEARING COSTS?

Find out how this high-production machine can give you more cuts, cleaner cuts on your shearing operations. Write for more information and latest bulletin. Kling Bros. Engineering Works, 1324 North Kostner Avenue, Chicago 51, Illinois.

in our 60th Year

Kling

...an investment in speed!



"That's it! I'll bet that's the answer to my coating problem"

"Ted Hubbard, what *are* you talking about?" asked his wife.

"That wax paper you're tearing . . . that may be the answer to the thing that's been giving the can manufacturers all the trouble."

Ted, an Inland mill representative, had been working for some time on a very peculiar problem in the plant of a large can maker and Inland tin plate customer. In lacquering tin plate for can ends, this customer's sheets had been coming through with "eye holes" (pin-head-size spots where lacquer failed to coat). Neither Ted, nor anyone else, had been able to learn *why*.

Ted, idly watching his wife tear wax paper from a roll, remembered: *If rapping tin plate packages in wax paper was standard practice for many steel producers, and paraffin, a mineral oil derivative, would not mix with lacquer.*

Ted had a hunch.

Next day, the problem was solved! Ted proved that when the tin plate was removed from the wax paper wrapper, microscopic wax particles adhered to the edges of the sheets. During the lacquering process, these particles were drawn up from the edges and across the sheets by suction from the lifting device . . . were picked up by the roller coaters . . . and wherever a particle lodged, lacquer failed to coat that spot on the sheet. This was the cause of the eye holes.

Tin plate producers switched to a different type of paper wrapping with the result: no more eye holes! INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago 3, Illinois.

Names used are fictitious

Making Steel
Do Your Job Well
Is Inland's Job

Your Scrap is Needed by The Steel Industry for National Defense

New Wage, Price Formulas Ahead

The present setup will be out if the steel union wins, and it probably will—15 cents an hour, with a partially offsetting steel price increase of about $7.50 a ton

WATCH for new wage and price formulas next month.

They may result from settlement of the steel wage dispute now being considered by a six-man fact-finding panel in Washington. If the present wage and price formulas are broken in the steel wage case, another large measure of inflation will follow.

The view is predicated on the belief of industrialists that the steel wage case will be settled by permitting substantial wage increase to the United Steelworkers-CIO and partially offsetting increase in steel prices. Guesses as to the amount of the wage increase range between 12 and 20 cents an hour, with 15 cents a favorite figure. Steel men figure such an increase would require price advances of from $5 to $15 a ton. Should a 15-cent wage increase be granted, the average steel price increase might well be in the neighborhood of $7.50 a ton.

Election Year — Industry men reason this way: Steelworkers gained hefty increases in each of the first five postwar wage negotiations (see chart). Often the union gained the advances only after the administration virtually directed the industry to grant them. This is an election year. The administration needs the support of the CIO and is not likely to turn its back on their demands. So a wage increase will be approved for the union.

The industry contends that a wage increase of 15 cents an hour, without a compensatory price increase, would not only wipe out current earning but would leave the industry with a substantial operating deficit. They would have nothing with which to pay taxes, dividends nor profits to finance replacement, modernization and expansion programs.

Figure the Cost—Each penny in hourly wage increase would cost the steel producing industry about $30 million. The immediate and direct cost of a 15-cent hourly increase would be $450 million.

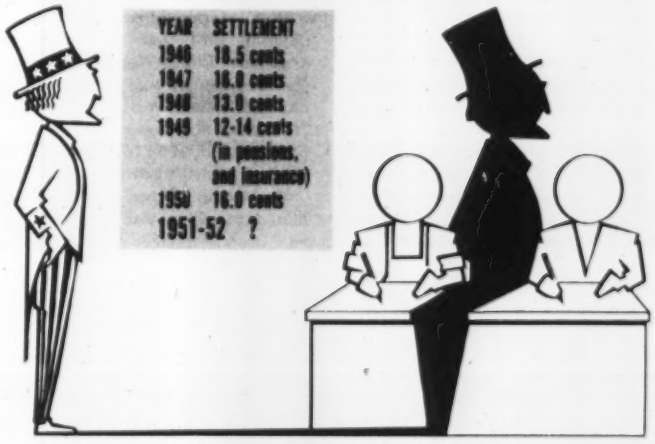
As other industries are compelled to pay similar increases, the costs of goods and services purchased by the steel industry rise. United States Steel Corp. figures the added costs in goods and services purchased from others will equal the dollar cost of the direct wage increase. On this basis, a 15-cent wage increase would cost the industry $900 million a year.

Per Ton—Finished steel production last year was nearly 80 million tons. Thus $900 million in added costs would mean an increase of about $11 per ton of finished steel.

Metalworking executives are not much impressed by the various studies being made by administration economists purporting to show that a wage increase could be absorbed by the industry without any compensatory price increase, nor by the arguments that wage increases of the order asked by the union can be granted without breaking the present wage formula. These they regard as specious attempts to wriggle out of what is an embarrassing situation for the price and wage fixers.

They doubt that the price fixers will permit a price increase that will compensate for both the direct cost of the wage increase and the increased cost in goods and services resulting from the extension of the wage increase. They expect they will get something more than the amount required to offset the direct cost of the wage increase. Hence the $7.50 a ton estimate.

Postwar Steel Wage Settlements



More Jobs in 1952

Employment is about to reach the highest peak in the nation's history. Sixty-three million jobs will be filled at midsummer peak, predicts Labor Department.

Heavy defense industries, having completed tooling and designing for volume production, will start to mass-hire during the first half of the year. Already nearly $50 billion in new defense procurement contracts have been awarded, and almost $25 billion invested in new plants and equipment. Yet a number of areas will face serious unemployment problems.

Cutbacks in materials, principally metals, for civilian goods will continue to force industries to layoff employees. Detroit and other

areas where such hard industries are concentrated will continue to face serious unemployment problems.

At the same time, many local areas will see serious manpower shortages in 1952. We shall face even greater shortages of engineers, managerial workers, toolmakers, machinists, and draftsmen.

It is hoped that a greater demand for civilian soft goods will occur in the early months of 1952. Since the inflationary rise in the first quarter of last year, the lack of demand for these goods has caused pools of unemployment in various sections of the nation. Seasonal occupations, such as agriculture and construction, will help raise employment to the expected all-time high during the summer.

Labor Department expects more occupational shifts than ever, which will bring increasing problems of quits and absenteeism. Mining, agriculture, foundry work and other less attractive occupations, will be far short of manpower. Defense industry must draw its employees from less essential jobs and in many areas must recruit women, older workers, the handicapped and minority groups.

Mercury, Employment Drop

Heavy snows and extremely cold weather cut off more than 600,000 jobs during November and December, says the United States Department of Commerce. Yet a slight up-turn in industrial employment eased the seasonal drop caused by unemployment in agriculture, and 61 million people had civilian jobs in December.

Industrial employment rose as previously unemployed women found jobs. There was little change in the number of men seeking work. A year ago, says the Commerce Department, we had 600,000 more unemployed than we have today.

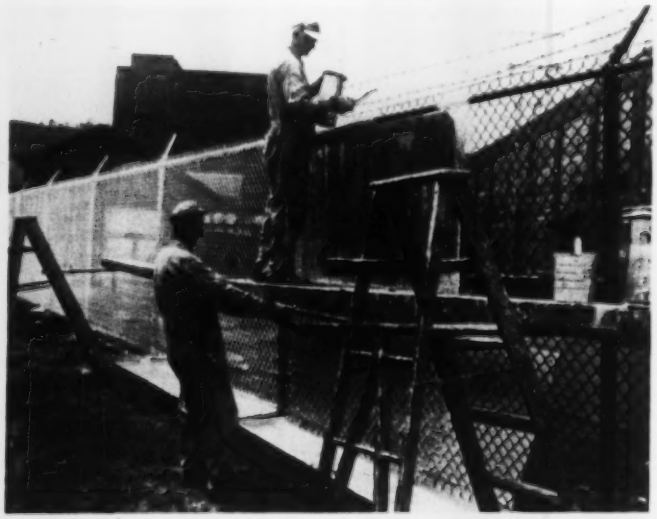
Stoppages Shorter in 1951

Work stoppages cost fewer man-days in 1951 than in any other year since World War II, estimates the Department of Labor. Man-days of idleness resulting directly from work stoppages dropped from 38,800,000 in 1950 to 22,600,000 in 1951.

Despite a 40 per cent drop in man-days, there was only a 5 per cent drop in number of work shortages. Fourteen of the 21 large strikes of 1951 were of brief duration, seven lasting less than a week, and seven lasting from one to two weeks. Only two stoppages lost more than a million man-days.

Aluminum Pact Comes To Head

Unless Steelworkers' contracts with two big aluminum companies are extended again, their strike issue will come to a head three weeks before those with the steel extension deadline. Negotiations now are in progress between the union and Kaiser Aluminum & Chemical Co. (in San Francisco) and Aluminum Co. of America (in Pittsburgh). The aluminum agreements, affecting about 30,000 workers, lapsed in December but two extensions brought expiration date to Jan. 31. Any general wage increase negotiated will be retroactive to Dec. 3, 1951.



PAINTING BY GRAVITY: These painters are covering wire fence with aluminum paint by pouring it along the top edge instead of brushing or spraying. The idea, hatched by R. W. Spence, a paint foreman at Aluminum Co. of America's New Kensington works, cuts maintenance costs in half. One painter can quickly touch up the "skips" with a brush

New Face at the Door?

With the second half of this year may come the steel salesman looking for business

STEEL salesmen may be knocking on your door in the last half of this year.

That's what some of the top brass in the steel industry think.

Consider what John F. Smith Jr. says. He's vice president in charge of sales for Inland Steel Co., Chicago. "Adequacy of steel supplies will become evident in the second half of 1952, and before the year is out the industry may be selling steel in contrast to the present situation of allotments to customers."

"We'll Catch Up"—From Frank Purnell, Youngstown Sheet & Tube Co.'s chairman, comes this report: "The steel industry will operate at top peaks for at least six months but the steel supply will catch up with demand in the last half of this year."

Mr. Purnell points out that 10 million tons of new steel capacity will go into production during 1952 and another couple of million tons in 1953. "The government just can't consume all the additional steel that will be turned out." Unlike World War II days, military demands now take only 12 per cent of the steel output.

Six Reasons — Mr. Smith's appraisal of factors affecting steel

supplies is like this: 1. Estimated peak military requirements for steel do not exceed 15 per cent of the supply. 2. Defense expenditures include very large amounts for nonferrous metals, and supply of some of these may determine the program's pace. 3. Steel inventory position of defense-supporting industries is improved. 4. No big shipbuilding program is in sight. 5. Steel required for the steel industry expansion program will largely have been supplied by the middle of this year, and thus some of the pressure should be off for structural shapes. 6. Steel production in 1952 could total 115 million tons of ingots, compared with 90 million in 1950 and 105 million in 1951; these increases alone are almost equal to the estimated direct military requirements.

NEW COACH—SAME TEAM: Secretary of Commerce Charles Sawyer congratulates Henry H. Fowler after swearing him in as NPA administrator to succeed Manly Fleischmann. Mr. Fowler served as NPA deputy administrator since September, 1951, and before that in various government capacities. Mr. Fleischmann continues as administrator of the DPA

NPA Will Play Doctor at CMP Clinics

Patients at the clinics will be companies that have been cut back 65 per cent or more on copper and aluminum. Clinics will be held in 16 cities, beginning this week

NPA WILL TRY to iron out some of the wrinkles in CMP at clinics beginning about Jan. 15.

The meetings will seek help for an estimated 3000 metalworking firms who will get less than 35 per cent of their normal copper and aluminum during this first quarter. If you have been cut 65 per cent on those nonferrous metals, consult the nearest regional office of the Commerce Department as to whether you're eligible for help and for the dates and places. Sixteen cities will be scenes of the gatherings.

The How of the Matter — At those clinics, the plight of the companies will be outlined. Present will be representatives of the armed services and other procurement agencies, and also representatives of most large military prime contractors. The object will be to give distressed companies help through subcontracts or prime contracts.

NPA believes that the situation in steel is not nearly as serious, so no clinics are planned for it. The government agency bases that decision partly on the surprisingly small response to its invitation to complain. That's through its NPAF-148 forms whereby a company unable to cash first-quarter CMP tickets can fill out the form and have its case investigated.

Form-Shy—Through Jan. 4, only 164 firms had filled out form 148, for a total of 82,269 tons. Total finished steel output this quarter will be about 20 million tons, so the complaints account for less than half of 1 per cent of the tonnage. Of the 164 cases, homes had been found for 35 of the CMP allotments as of last week.

NPA interprets the small number of returns of Form 148 as indicating steel supplies are in good shape. According to a STEEL survey on the subject (Dec. 24, p.26), the situation is not that rosy. Many companies are tired of government forms and pessimitic about the help offered, so don't file even though they have steel troubles.

Another Look — Washington planners will try to improve still further CMP's functioning in the second quarter. DPA appointed a special temporary task force to examine military requirements for controlled materials for April, May and June. The task force will intensify the present screening of all military requirements, make sure the military is using substitute materials wherever possible and refer to the Defense Department for verification any military demands that appear to be out of line.

Task force members are: William L. Campbell, deputy DPA administrator for procurement and production; Albert J. Carey, assistant deputy DPA administrator, office of program and requirements; William N. Lawrence, director of the military and atomic energy division in DPA's office of program and requirements.

Shortages: DPA Surveys Outlook

Most supplies of metals are now at generally stabilized levels, says Defense Production Administration. Alloying elements, nonferrous and ferrous, remain critical, but are holding their own rather than tightening further. Copper, nickel, cobalt, tin, lead and zinc are even more scarce, although cadmium is easing. Cold-rolled steel strip is in fair-to-good supply.

The worst scrap shortage in history will face the steel industry in the next 3 or 4 months.

Copper will continue to be the most critical nonferrous metal, with little relief expected. Tin inventories are nearly exhausted, while zinc and lead are almost as scarce as copper.

Nearly All You Need

Compared with most other components, the supply situation for bearings is good

YOU MAY have to wait a little longer than normal, but you should be able to get most of the anti-friction bearings you need in 1952.

Bearings are among the least difficult of components to obtain. That doesn't mean that everything's rosy; deliveries on specialty products, particularly, are extended and bearing manufacturers are having the usual materials difficulties, but, relatively, the situation is good.

Two Factors The bearings industry will meet 1952 demand because of two developments: Automotive demand has declined; new capacity will be in operation sometime this year. Dollar sales in the next 12 months should exceed the $453.6 million worth that were delivered in 1950, the last year for which complete figures are available. The 1951 sales probably surpassed the 1950 level slightly.

Sales of bearings will rise in 1952, despite the loss of some automotive business, because of increasing defense volume. Today nearly 75 per cent of all bearings are made for defense or defense-support purposes, compared with 25 per cent just nine months ago. About one-third of all bearings now are going into direct defense use. Because of that high ratio, the industry is doing well on materials allocations. Like everyone else, it has trouble finding nickel alloy steels, aluminum and copper. Luckily, only small amounts of the nonferrous metals are needed.

Alternates Widespread use of alternate materials is not feasible in bearing manufacture, but the industry is partly bypassing the shortage of nickel stainless steels by resorting to more cadmium plating. That was done a good deal during World War II. The major defense uses for bearings now are in aircraft, atomic energy applications, military tanks, motor vehicles and machine tools. The use is growing markedly for smaller instrument bearings, as used in aircraft.

Instrument bearings are being imported, but few other types of the product are. Small tonnages of bearing-grade steels are also being purchased abroad, but total imports of suitable steels or bearings are not substantial.

Blast Furnace Output Slips

Blast furnace production failed in November to maintain the record rate set in October.

November output totaled 5,911,373 net tons and represented 99.1 per cent of the industry's capacity, the American Iron and Steel Institute reports. In October, production was at 100.6 per cent of capacity and yielded 6,197,176 net tons.

All of the decline was accounted for in pig iron production. In contrast, there was a slight increase in output of ferromanganese and spiegel.

1951	Pig Iron	Ferromanganese and Spiegel	Total Blast Furnace Output
October	6,132,051	65,125	6,197,176
November	5,843,020	68,353	5,911,373
11 mos.	64,574,823	680,618	65,255,441
1950			
November	5,330,550	55,988	5,386,538
11 mos.	59,181,846	609,289	59,791,135

Taconite for Two

Republic Steel Corp. and Armco Steel Corp. jointly acquired the 15 per cent interest National Steel Corp. held in Reserve Mining Co. This gives Republic and Armco each a 50 per cent ownership.

Because of expansion in their blast furnace capacities, Republic and Armco are interested in immediate development of Reserve's plant in Minnesota to produce 2.5 million tons of high grade iron ore a year from taconite.

Mineral Output Climbs

The mineral industry of the U. S. increased its production by almost 10 per cent in 1951, according to Secretary of the Interior Oscar L. Chapman. At the same time, the total value of mineral production increased 13 per cent to $13.3 billion.

Trudging Scrap Progress

Even with a break from the winter weather the shortage is and will remain critical

BOGGED DOWN in snow drifts for much of the winter, the nation's scrap drive is making only trudging progress. Clearer skies in the past two weeks, particularly in Chicago which is suffering one of the severest winters in its history, may help get scrap moving again. Scrap dealers in the windy, snowy city reported serious difficulty moving loaded railroad cars from

FOUR UP, TWENTY TO GO: Each of the four electric furnaces in operation in Electro Metallurgical Co.'s new Marietta, O. plant is about the size of a three-story house. Eventually there will be 24 of the submerged-arc type furnaces at the $100 million ferro-alloy plant. From the charging floor ores and other raw materials are fed around the huge electrodes

IRON FROM SLAG: Mining scrap iron from an old slag dump, the Michigan Foundry & Supply Co. uses a Lorain shovel with a ¾-yard bucket. The slag is loaded into a magnetic separator and the iron trucked back for use

IRON FROM WATER: Tons of usable iron ore dust are recovered daily from blast furnace sludge by this 105-foot diameter Walker concrete thickener basin at the Jones & Laughlin Steel Corp.'s stacks in Aliquippa, Pa.

their yards and in getting empty cars for loading.

NPA says the scrap shortage put a crimp in steel production for the first time. Three furnaces at U. S. Steel's Gary, Ind., works were shut down. Five small furnaces in Pittsburgh were idled.

Cloudy Weather—Even if the weather continues fair the scrap shortage will remain critical. DPA Administrator Manly Fleischmann appointed a four-man committee to keep him advised on the scrap situation. The Institute of Scrap Iron & Steel notes the seriousness of the shortage: Underlying the principal address at the current 24th annual convention in New York is the scrap supply theme. The problem posed for scrap dealers and brokers in the institute: How to get 36 million tons of purchased scrap in 1952—2 million tons more than was consumed in 1951.

Willys Reopens Forging Plant

Willys-Overland Motors Inc. announces that it has completed reactivation of the $14 million government-owned aluminum forging plant in Erie, Pa.

The newly opened plant is one of the largest aluminum forging units in the country, with twenty-seven drop-forge hammers, ranging in capacity from 750 to 20,000 pounds. An estimated capacity of 15 million pounds from the Erie plant, coupled with its Toledo drop-forge division's output, gives Willys a total capacity of more than 48 million pounds annually of aluminum forgings.

Packaging Aplenty

Containers and packaging materials in best supply-demand balance since mid-1950

IF PACKAGING is your problem, you can be a bit more choosy about what you use and buy.

The U. S. Department of Commerce says the supply of containers and their demand are more nearly in balance now than at any time since June, 1950, and checks in the metalworking industry by STEEL verify this.

Easy Going—There may be some tight spots here and there during the first part of 1952, but these shouldn't be too troublesome, for there'll be adequate supplies of substitute packaging.

Indicative of the easy supply of containers, the purchasing agent of a Chicago metalworking company not only is getting all of the corrugated paperboard cartons and wirebound wooden boxes he wants but finds the market for them has become competitive and that makers could use more packaging business.

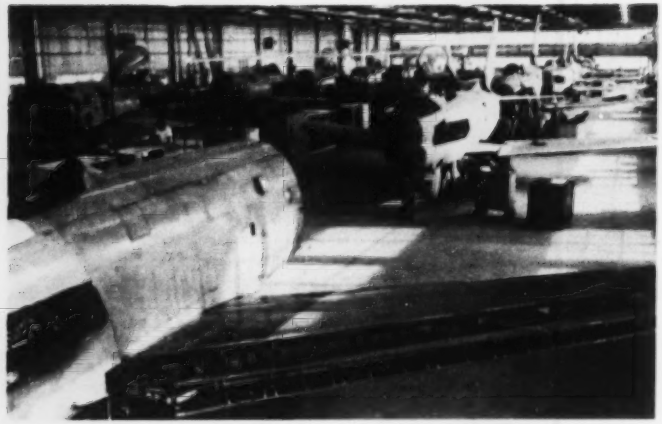
Coast to Coast—Across the country, metalworking companies say the same thing: We can't see any container and packaging supply procurement problems ahead for the next three months.

Why the easing? First, there has been an expansion in output of some basic materials used by containers and packaging industries. Then there is an adequate supply of substitute or alternate containers.

Government controls on use and inventories of some types of containers are credited with evening out the supply and bringing about greater reuse of them. To further hasten the return and reuse of steel drums, the National Production Authority incorporated an "incentive plan" in its steel shipping drums control order (M-75) a month ago. Now, a packer may receive used drums, returned to him by his customer under this plan, above his inventory quota as long as the quantity of any particular size or type of reused drums is not more than a third of that of any size or type which he otherwise would be permitted to have in inventory.

Search for Savings—In addition to trying to get the lowest possible price quotations on packaging and containers, users are looking for lower-cost ways of packaging. Take A. S. Campbell Co. Inc. for instance. This East Boston, Mass., metal fabricator turned to egg-crate pallet type shipping of bumper materials for the auto industry. The change brings savings in materials handling both at the Campbell plant and at the automotive assembly line. These parts formerly were shipped in solid wooden boxes. Campbell's foundry division, Hunt-Spiller Mfg. Corp., South Boston, changed from wooden box and special wood shipping assembly to heavy paper with flat strapping through arrangement with a paper company for a special container design.

Both Campbell and Hunt-Spiller report their new packaging passed the acid test: Freight damage is negligible.



TOUGHIES: North American F86D Sabres, only U. S. single-place all-weather interceptor, are being flight tested with electronic and related equipment. Sabre production flight lines now occupy two hangars at the Los Angeles International Airport which the company has leased from the city

Accent on Production for Defense in 1952

DELIVERIES for the defense program currently are triple what they were at the end of 1950: Nearly $2 billion a month, says the Office of Defense Mobilization.

Since the outbreak of hostilities in Korea, June, 1950, more than $55 billion in military contracts have been awarded. Deliveries total about $15 billion. These figures are based on latest official calculations and cover the period through Oct. 31, 1951.

On top of the delivery figures must be added about $1.5 billion in war materiel shipped to Europe under the mutual security program.

Typical Case — Typical of the emphasis in defense mobilization for 1951 is the aircraft industry. Stress was placed on expansion of the industry's productive capacity rather than on aircraft delivery. Output of military aircraft in 1951 is estimated at 4500 to 5000 units, compared with 3000 for 1950. But, the number of employees in the industry doubled since the outbreak in Korea to 600,000 persons. Nearly one million workers are scheduled to be on the payroll by the end of 1952. Twelve major airframe makers report nearly 7 million square feet of floor space added since Korea, and another 15 million square feet being prepared.

The outlook for 1952 is for a speed-up of production with the goal a 1500-plane or more monthly rate late in the year.

Contracts awarded by the government, in excess of $250,000:

Product	Contractor
Diesel Generators	Diesel Div. National Metal & Steel Corp., Terminal Island, Calif.
Generators	Master Electric Co., Dayton, O.
	Fabricon Products Inc., River Rouge, Mich.
Control Systems	Hagan Corp., Pittsburgh
Inverters	Eicor Inc., Chicago
Converter Sets	Western Electric Co. Inc., New York
Public Address Sets	Minshall-Estey Organ Inc., Brattleboro, Vt.
Mountings	Astral Industries Inc., Northvale, N. J.
Machmeters	Kollsman Instrument Corp., Elmhurst, N. Y.
Cameras & Spare Parts	Bolsey Corp. of America, N. Y.
Airplanes	Consolidated Vultee Aircraft Corp., San Diego, Calif.
Kits & Subassemblies	Lockheed Aircraft Corp., Burbank, Calif.
Aircraft Spares	Cessna Aircraft Co., Wichita, Kans.
(2 contracts)	Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
	Hamilton Standard Div., United Aircraft Corp., East Hartford, Conn.
Engine Build-up Stands	Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
Shotgun Shells	Federal Cartridge Corp., Minneapolis
	Remington Arms Co. Inc., Bridgeport, Conn.
Gun Tube Forgings	Ridgewood Ordnance Inc., Cincinnati
Bolt Assemblies for M1 Rifle	Underwood Corp., New York
50 Cal. Machine Gun Mounts	Birtman Electric Co., Rock Island, Ill.
105 mm Howitzer Carriages	Parish Pressed Steel Co., Reading, Pa.
105 mm Howitzer Recoil Mechanisms	R. Hoe & Co. Inc., New York
Lathes	R. K. LeBlond Machine Tool Co., Cincinnati
Aluminum Canteens	Aluminum Goods Mfg. Co., Manitowoc, Wis.
Dental Instrument Cabinets	Hamilton Mfg. Co., Two Rivers, Wis.

Open For Suggestions

Renegotiation Board will review requests for rule changes by those affected

IF YOU don't like the new renegotiation rules designed to cut excessive profits out of defense contracts, the Renegotiation Board will welcome your suggestions for improvements.

Regulations applying to the 1951 Renegotiation Act were issued as "proposed regulations to give everyone affected by them a chance to suggest changes", says John T. Koehler, Chairman of the Renegotiation Board. The suggestions must be submitted for review by Jan. 30 as the regulations will probably be issued in permanent form early in February. Some highlights of the proposed regulations:

Evidence — Reasonable profits will be determined on the merits of each case and not according to a fixed formula. Allowable profits will *not* be based on a percentage of costs. A contractor may present whatever information he may consider pertinent to the determination.

Finances — Financial statements must be filed by every person who holds prime or subcontracts subject to the act, even though no income was received or accrued during the contractor's fiscal year. If your fiscal year ended before Nov. 30, 1951, you must file by March 1. If it ended on Dec. 31, 1951, you have until April 1 for filing.

Miscellany — Certain raw materials are tentatively listed as exempted from renegotiation; these lists are not final or binding on the Board. The Board may grant permissive exemptions at its discretion. The stock item exemption effective date has been extended from Jan. 1, 1952 to Jan. 1, 1953. Instructions to primes and subs on how to segregate renegotiable sales are included in the proposed regulations.

Industry Gets Loans

V-loans to industry reached $1.28 billion by December, according to the Federal Reserve Board. Another $476 million was ready to be handed over to borrowers.

CHECKLIST ON CONTROLS

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, write to NPA Distribution Section, First Basement, New GAO Bldg., Washington 25. For copies of OPS orders, contact nearest OPS district or regional office. For copies of OPS news releases, write David S. Phillips, director, OPS Administrative Services Division, Temporary E Bldg., Washington 25.

Materials Orders

TIN CANS—Direction 3 to NPA Order M-25 continues the procedure whereby users of tin cans may adjust their bases for the first three quarters of 1952. Direction 3, issued Dec. 29, 1951, supersedes Direction 1, revoked Jan. 1, 1952.

MARINE MRO—Amendment of Dec. 28, 1951, of NPA Order M-70 (marine maintenance, repair and operating supplies) permits increased use of the DO-R-9 rating for minor capital additions. The amendment was effective Jan. 1, 1952.

OIL COUNTRY GOODS—Schedule 2 to NPA Order M-6A is designed to prevent distribution of oil country tubular goods from warehouses except on authorized controlled materials orders. Schedule 2, issued Dec. 28, 1951, was effective Jan. 1, 1952.

CHEMICAL WOOD PULP—Amendment of Dec. 29, 1951, of NPA Order M-72 changes certain restrictions on inventories of chemical wood pulp.

PASSENGER AUTOS—Amendment of Dec. 28, 1951, of NPA Order M-68 extends the percentage-of-industry ranking of automobile manufacturers into the first quarter of 1952.

CONSUMER DURABLES—Directions 1 and 2 to NPA Order M-47A were revoked Jan. 1, 1952. Those directions applied to use of iron and steel, copper and aluminum in consumer durable goods during portions of 1951.

SULPHUR, SULPHURIC ACID—To further restrict consumption of sulphur and sulphuric acid beginning Jan. 1, 1952, the NPA issued Order M-94 (sulphuric acid), amended Order M-69 (sulphur), and revoked Schedule 3 of Order M-45.

STEEL DISTRIBUTORS—NPA Order M-6 and Directions 1, 2 and 3 to it were revoked Jan. 1, 1952. This order, covering steel distributors, is superseded by M-6A.

RAILROAD EQUIPMENT—NPA Order M-95, issued Jan. 4, 1952, and effective that date, sets up reporting procedures for manufacturers of railroad locomotives and cars.

CHLORINE—Amendment of Jan. 7, 1952, of NPA Order M-31 extends this basic chlorine order from 1951 to 1952.

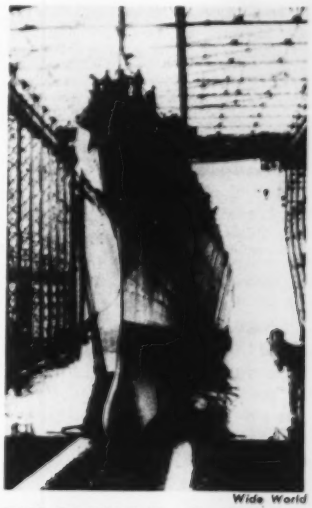
RUBBER—Supplement 1 to NPA Order M-2, the basic rubber order, was revoked Jan. 7, 1952, because the supplement is superseded by other portions of M-2.

Controlled Materials Plan

SMALL CONSUMERS — Amendment of Jan. 5, 1952, of Direction 1 to CMP Regulation 1 tightens the self-authorization procedure by which small consumers obtain steel, copper and aluminum. The amendment was effective Jan. 5, 1952.

DELAYED DELIVERIES — Amendment 1 of Jan. 5, 1952, of CMP Regulation 1 permits manufacturers to accept shipment of controlled materials, on which delivery has been delayed, until a subsequent quarter without charging the shipments against the allotment for the later quarter. Previously, shipments delayed more than 15 days after the end of one quarter had to be charged against the purchaser's allotment for the next quarter, when delivery was actually accomplished. Because of unavoidable delays, this provision created hardships on many companies unable to obtain delivery on all controlled materials orders during the quarter for which delivery originally was scheduled. Amendment 1 was effective Jan. 5, 1952.

USE OF INVENTORIES—Amendment 2 of Jan. 5, 1952, of CMP Regulation 1 prohibits makers of Class B products who receive CMP-4B allotments from putting into production during any quarter a quantity of controlled materials greater than that allotted, unless they are expressly authorized to use controlled materials in inventory. This amendment, effective Jan. 5, 1952, is designed to remove the incentive for accumulating large inventories. This amendment has no effect on authorized production schedules for the first quarter of 1952 since the CMP-4B allotments issued for the first quarter authorized the use of inventory in addition to allotments.



Wide World

FIRST OF ITS KIND: The $4 million destroyer leader, U.S.S. Norfolk, first naval combat ship built since the end of World War II, slides down the ways at the New York Shipbuilding yards, Camden, N. J. She's a 5500-tonner

Price Regulations

OVERHEAD ADJUSTMENTS — Amendment 1 of Revision 1 of Supplementary Regulation 1 to Ceiling Price Regulation 30 provides manufacturers of machinery and related products with a simplified method of calculating certain overhead adjustment factors. The amendment was effective Dec. 31, 1951.

MACHINERY—Amendment 27 of Ceiling Price Regulation 30 adds to and clarifies commodity classification listings under Appendix A to CPR 30 (machinery). The amendment was effective Dec. 27, 1951.

COKE, CHEMICALS, GAS—Amendment 5 to Supplementary Regulation 13 to the General Ceiling Price Regulation extends the expiration date of SR 13 (coke, coal chemicals and coke oven gas) from Dec. 31, 1951, to midnight Feb. 29, 1952. A permanent regulation on pricing of these products is being prepared, but additional time is needed to complete it.

LEAD—Amendment 1 of Supplementary Regulation 71 to the General Ceiling Price Regulation corrects the premium for corroding lead made from copper-ized lead. The premium should be 15 cents a pound, not 16. Amendment 1 was effective Dec. 28, 1951.

MANUFACTURERS—Amendment 39 of Ceiling Price Regulation 22 simplifies pricing of manufactured commodities whose ceilings cannot be determined in the usual manner provided in the regulation. These generally, are new commodities not sold in the base period. Amendment 39 was effective Jan. 4, 1952.

MACHINERY—Amendment 28 of Ceiling Price Regulation 30 permits manufacturers of certain new commodities and manufacturers starting in business after Jan. 1, 1950, who are unable to determine ceiling prices under the machinery ceiling price regulation (CPR 30) without applying to the Office of Price Stabilization, to continue to use their ceiling prices established under the General Ceiling Price Regulation until Feb. 20, 1952. The amendment was effective Jan. 4, 1952.

MACHINE TOOLS—Amendment 4 of Revision 1 of Supplementary Regulation 2 to Ceiling Price Regulation 30 permits machine tool manufacturers to compute increases in their costs for overtime labor and shift premium hours, and increased subcontracting, so that any modification in their ceiling price for each fiscal quarter can be expressed as a single change. The amendment was effective Jan. 9, 1952.

MACHINERY RESELLERS—Amendment 7 of Ceiling Price Regulation 67 permits resellers of machinery and related manufactured goods to determine their ceiling prices by using the highest percentage markup or the lowest discount that they realized during the Apr-1-June 24, 1950, period, rather than their last markup or discount. Admendment 7 was effective Jan. 12, 1952.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor*

Election forecasters, at it again, see no clear-cut victory for either party. Presidential race depends on candidates but prospects favor Democratic House and Senate majorities

PREDICTING election results is a chancy business but with the 1952 fights coming up veteran Washington political observers are at it again. Their forecasts are noteworthy because they anticipate no clear-cut victory for either party.

If Truman runs against any Republican except Eisenhower, they see Truman the winner. If Truman runs against Eisenhower, they give Eisenhower a slight edge. If some other Democrat runs against Eisenhower, Ike's advantage should increase. If some other Democrat runs with Truman's backing against any of the other Republicans he should have a better-than-even chance.

In our present-day Washington there is a cynical tendency to believe that the mink coat and tax scandals and other instances of dishonesty among government employees will not influence any undue portion of the people in casting their votes. A lot of people in this country, including particularly workers and farmers, think they have fared well under the Democrats.

Congress?—But that is only the forecast for the Presidential race. What about Congress? Prognosticators think the prospects favor Democratic majorities in both House and Senate in 1953 and 1954, with the committees under Democratic leadership. Thus again we would witness majority decisions by coalitions of northern Republicans and southern Democrats, with neither party able to enact platform promises.

The outlook may be illustrated in the case of the Senate with the House prospects quite similar. For Republicans to have a Senate majority of only one in the next Congress it will be necessary to elect 20 Republican candidates who will run this year, and defeat three of the 14 Democratic candidates. Will this be possible?

Miraculous—The cold facts do not seem to warrant such an outcome. Of the 20 Republicans only 6 are from states regarded as safely Republican—one each from Maine, Vermont, Indiana, North Dakota and two from Nebraska. Six are regarded as "reasonably safe"—one each from New York, Pennsylvania, Wisconsin, New Jersey, Minnesota and California.

CRYSTAL BALL ON THE ELECTION
. . . *Washington's favorite pastime*

The remaining eight—one each from Massachusetts, Delaware, Ohio, Missouri, Utah, Nevada, Montana and Washington—on the basis of historical pattern of senatorial elections will stand only a 28 to 80 chance of victory. Prognosticators think that, no matter how favorable the conditions might be at election time, victories by all eight Republicans in this latter group would be miraculous.

Scanning the Field—Where would the Republicans defeat three Democratic senatorial candidates? Of the 14 Democrats in the race five will run in the solid south and are "safe." So the Republicans would have to pick up three Senate seats in these states: Arizona, New Mexico, Rhode Island, Kentucky, Maryland, West Virginia, Wyoming, Michigan and Connecticut. Taking local conditions into account, forecasters give the Republicans a good chance of picking up four seats—in Wyoming, Michigan, Connecticut and Maryland.

Legislative Musts . . .

Principal legislative "musts" facing Congress in this session:

Appropriations for fiscal 1953, with big controversies ahead as to need for domestic military program, and the size and character of military and economic assistance to foreign nations.

Extension beyond next June 30 of the Defense Production Act as amended; should present wage, price, credit, materials and other controls be continued as is, modified, or abandoned?

Overhauling and reorganization of the Bureau of Internal Revenue setup in the light of recent tax scandals involving many collectors.

Final determination of the controversial St. Lawrence seaway.

Bargaining for Tin . . .

Reconstruction Finance Corp.'s tin-buying strike is cutting stocks rapidly—to the alarm of tin users. Only Indonesia and Belgian Congo tin (about 10,500 tons annually) is being received now.

Appointment of Harry A. McDonald, chairman of the Securities and Exchange Commission as head of RFC is not expected to result in a policy turnabout. W. Stuart Symington's resignation, despite speculation to the contrary, can be regarded chiefly as a move by him to avoid being a target for election-time mud slinging.

Name on the FPC Door . . .

Amid the hubbub over General Eisenhower backing into the Republican camp and announcement of new chiefs for NPA and RFC, a new name was quietly being painted on a door in the Federal Power Commission's office. Into the job of chairman of the commission stepped former vice-chairman Thomas C. Buchanan, named by President Truman to succeed Mon C. Wallgren.

STEEL MAKERS ABROAD

ALSO BUY

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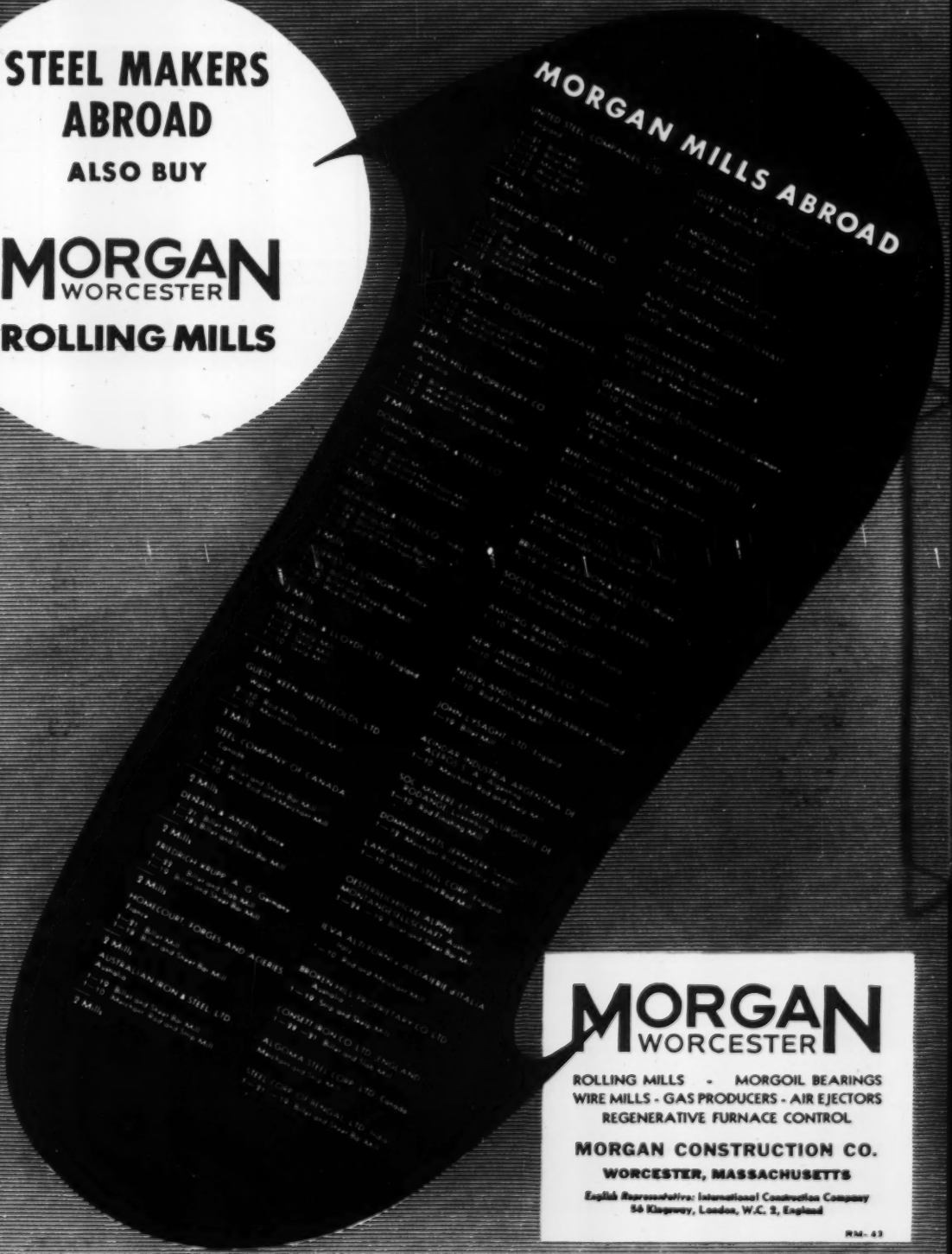

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MSA Takes Over European Aid Program

The Mutual Security Agency will ask for about $6 billion and some shifting of priorities for aid to Europe this year as Marshall Plan and ECA officially end six months early

THE WEIGHT of administering European assistance now rests on the Mutual Security Agency. The Marshall Plan and the Economic Cooperation Administration went out of existence Dec. 31, 1951.

The ECA expended $12 million in grants and loans in the European recovery program—equal to about $80 from every man, woman and child in the United States. To this, countries of Europe added the equivalent of another $9 billion in their own currencies.

That's the cost. Some of the results are: Steel production is up to nearly 60 million tons in 1951 from less than 31 million tons in 1947; in mid-1951, Europe's industry was using 20.5 million kilowatt-hours of electricity per month, compared with 13.5 million kilowatt-hours monthly in 1947; and production of motor vehicles was running at 145,000 vehicles monthly in 1951, compared with a rate of 54,000 vehicles in 1947.

Though the Marshall Plan officially closed its books six months ahead of schedule, the legal powers and functions given to ECA will be carried out until June 30, 1951, under MSA.

Mutual Security Administrator W. Averell Harriman, says he will ask Congress for about the same amount of money for arms aid to Europe next year as was requested last year. The administration last year asked for slightly less than $5 billion of arms aid and $1 billion of economic aid for European countries. Mr. Harriman says that Europe has the capacity for developing "striking" increases in its defense forces during the next year, but both Europe and the U. S. will have to do some juggling of priorities to accomplish the rearmament goal.

From U.S. to Europe: Coal

The Office of International Trade in the Commerce Department says it is fixing a monthly export "target" for coal of 4 265,000 tons in each of the first two months of 1952. OIT plans to license about 2.8 million tons of coal for shipment through Hampton Roads, Va. Total shipments to ECA countries through all U. S. ports will be about 3,785,000 tons each in January and February.

At the same time, the Organization for European Economic Cooperation (OEEC) reports in Geneva that the coal deficit of Western Europe will be 8.8 million tons for the first quarter of 1952. This is 8 per cent better than the fourth-quarter, 1951, deficit of 9.5 million tons. European nations will supply only 9.5 million tons of coal and 3 million tons of coke toward the first quarter, 1952, solid fuel requirements of the 18 countries of Western Europe and Trieste.

From Europe to U.S.: Tools

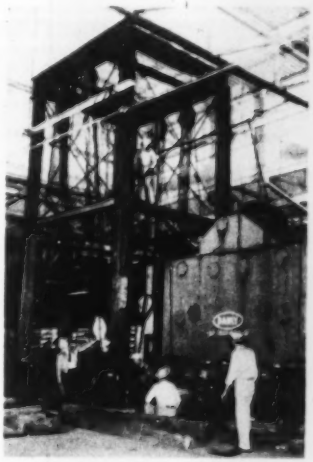
Imports of foreign-made machine tools jumped four-fold in October, 1951, over a year before. That's partly due to quicker delivery on foreign makes, and partly because the quality is often top-drawer and they're cheaper.

A lot of American buyers are still making trips to Europe to place hefty orders.

Wright Aeronautical Corp. recently spent $10 million for 1150 foreign-made precision cutting tools. Lockheed Aircraft Corp.'s Marietta, Ga., division purchased 81 machine tools in France, Switzerland and Germany at a cost of about $1.5 million. General Electric Corp. contracted to buy 125 tools abroad, costing more than $3 million. Pratt & Whitney Aircraft Corp. ordered 74 units for a total bill of nearly $1.7 million.

American machine tool builders are distressed despite such assurances as this from Harold Jones of Kurt Orban Co., U. S. importer of West German products: "We don't want to fight American builders. We're just trying to fill in the gaps."

He points out that foreign tools make up only a small precentage of machines owned by even the biggest U. S. buyers.



CRAMPED QUARTERS IN TEXAS: The 60-ton top section of a 1000-ton Danly forming press is slid into place at Texas Engineering & Mfg. Co. Inc., Dallas. By lowering the four 25-foot tie-bolts into foundation pier holes before installation began, two weeks were cut from construction time and it was not necessary to remove any part of the building roof

The Real Need

Industry wants more machine tools and it wants better ones, an ASTE survey shows

INCREASED production of machine tools is not enough.

Equally important in the job of providing increased productivity for both military and civilian needs are better and more accurate machine tools. Operating speeds and loading methods should be improved, too.

That's the consensus of a national survey made by the American Society of Tool Engineers among key production executives and engineers in large, small and in-between companies of American industry. Harry E. Conrad, executive secretary of the society, says, "only 7 per cent of companies queried believe that allout production of machine tools and other production equipment will solve our 'tooling for security' problems."

Quality Before Quantity Indus-

try in general puts the need for better machine tools ahead of more machines. Many companies took advantage of the ASTE survey to ask for a development program on better manufacturing equipment—right now.

Size of the company, as judged by new equipment purchases, has little influence on the question of better equipment. In the large companies, 93 per cent say that development programs on new equipment are needed right now. In the smallest companies the figure is slightly over 90 per cent.

The ASTE hopes that its industrial exposition in Chicago, Mar. 17-21, will promote an early development program by bringing production engineers and production equipment suppliers together for an exchange of ideas.

Machine Tool Bill Doubles

U. S. machine tool makers shipped approximately $619 million worth of tools in 1951, or double the 1950 total of $305,550,000, according to the National Machine Tool Builders Association. The tool industry may again double output in 1952 and possibly match the $1,320,000,000 record attained in 1942.

The gain is not all that it may seem, though. Prices have doubled since 1942, which means fewer machines can be shipped for the same bill. Another reason fewer machine tools will be shipped than in 1942, says NMTBA, is that 34 companies have gone out of business since then, leaving only some 240 firms still operating.

Tool and Die Makers Wanted

Defense orders for tools and dies will practically crowd out civilian tooling during 1952 predicts the National Tool & Die Manufacturing Association. Without these tools, dies, jigs and fixtures, it is impossible to keep machine tools, presses and other production equipment working on a mass production basis.

NPA recognition of the vital tool and die industry led to material priorities and a promise of more machine tools. DPA has given them the nod on tax amortizations for expansion.

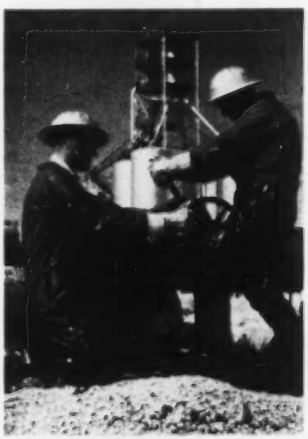
Metalworking Helps Bring in More Oil

Tubular products, compressors, pumps, containers, pipe lines and refinery equipment will be needed in a $3 billion oil and gas industry expansion for 1952

ONE OF metalworking's biggest customers, the oil and gas industry, will buy more than ever in 1952. That's because a capital expansion in oil and gas will continue unabated for at least another year, while new plant and equipment expenditures in most other industries will level off or decline slightly in 1952.

The world armament race and the Iranian oil crisis are the main reasons why more American oil is needed. The U. S., with roughly one-third of the world's oil resources, accounted for 2222 million barrels of the fuel or 56 per cent of the globe's total production in 1951, an increase of 4 per cent in the world ratio and a reversal in a trend because our percentage of world production had been dropping steadily until last year.

A Lot of Money—Total capital expenditures within the U. S. by the oil and gas industry averaged $2.1 billion a year from 1946 to 1949, hit $2.2 billion in 1949 and 1950, rose to an estimated $2.8 billion in 1951 and may reach $3 billion in 1952. Of that sum for 1952, nearly 60 per cent will be spent on crude oil, natural gas and other basic production, some 14 per cent on transportation, 16 per cent on refining and the rest on marketing and other facilities. The ratios are changing, with more emphasis on basic production, because of the greater need for crude. In 1949, nearly 20 per cent of all expansion was for refining, contrasted with an expected 16 per cent in 1952. The proportion devoted to new transportation facilities remains about the same, although the emphasis on the kinds of transportation is shifting.



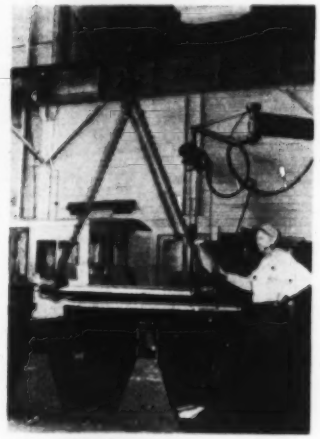
OIL REFINERIES
steel pinch hurts them most

Expansion in basic production of oil and gas is the key to metalworking sales opportunities both because more than half of the capital expenditures will be devoted to that phase and because refining, transportation and marketing expansions hinge upon increased basic output. The barometer indicating the extent of basic production expansion is the number of new wells drilled, even though in 1952 that activity will take only about 2 million tons of steel products, out of more than 8.5 million tons needed altogether by the industry in the next 12 months. A. E. Walker, National Supply Co. chairman and president, says U. S. encourages exploratory drilling.

Up and Up—An anticipated 45,000 new wells, to be drilled in 1952, compare with about 44,200 in 1951, 43,300 in 1950 and 39,000 in 1949. A few years ago an estimated 43 tons of steel products were required for each new well. That's increased to about 44.5 tons now, mainly because wells go deeper. Nearly 95 per cent of the steel used in well drilling is oil country goods (casing, tubing and drill pipe). The other 5 per cent goes into drills, pumps, compressors and related equipment. Because drilling is basic, Petroleum Administration for Defense promises to allot enough steel this year so the more than 5000 oil and gas producers can complete the 45,000 new wells.

The goal is eventually to drill 50,000 new oil and gas wells a year

—not likely to be achieved in 1952 because of inadequate capacity for tubular goods. Yet the goal is within reach because over the next 24 months our potential for producing oil country goods will be increased 25 per cent. Republic Steel Corp. this year in Chicago will start a seamless pipe mill capable of turning out a product ranging in outside diameter from $2\frac{3}{8}$ to $9\frac{5}{8}$ inches. Its capacity: 15,000 tons a month. Colorado Fuel & Iron Corp. by 1953 will have a Pueblo, Colo., mill in operation producing the same sizes as the Republic unit. At Daingerfield, Tex., Lone Star Steel Co. will have two welded pipe mills running by late this year or early next, to produce 30,000 tons of pipe and casing per month up to 15 inches OD. The severest shortage in oil country goods is in the smaller sizes.



OIL COUNTRY TUBULAR GOODS
. . . more than ever but not enough

Different Picture—The outlook for steel for other phases of the oil and gas industrys' expansion is not so bright. Just the same, oil and gas producers in 1952 will make out "as well or better than last year," according to an official of a large oil firm. "We are getting some tubular goods from European mills and Washington is equitably allocating pipe."

The steel pinch will hurt most the expansions in refineries and construction of tankers, tank trucks and tank cars and the fabrication of oil containers. The government tightened up on certificates of necessity for refinery building, the cutback being about 10 per cent. The shortage in water, road and rail transportation for oil has eased markedly in the past six months, so that phase of capital expansion is not being emphasized.

Buried Steel—The laying of pipeline will receive continued attention in 1952, although the transmission companies won't get all they want. Already some 60 million tons of steel pipe are buried in the U. S. to serve gas and oil users. Sales of pipe for lines averaged only 350,000 tons per year from 1936 through 1945, but in 1949 some 1.6 million tons of transmission lines were shipped; 2,425,000 tons in 1950 and a little more than that in 1951. Up to 3 million tons could be used this year, but the pipeline companies will settle for 2.5 million tons. More than 545,000 miles of oil and gas transmission lines are now in U. S. soil.

The petroleum industry won't be able to pack all its products the way it would like to in 1952—nor could it in 1951. That's because the allocations of black plate used for oil containers is insufficient. Allocations are based on 90 per cent of what the oil companies used in 1950 or 1949. As a substitute, they're turning to bulk packaging and fiber containers.

Stickler—Another tough shortage problem this year will be specialty tubing. One type of alloy composition is used for cracking still tubes. Due to the scarcity of chromium and molybdenum, that product will remain at low production levels during the year. Also included as specialty goods is material for auxiliary parts, such as mechanical tubing for pumps and carbon tubes for refineries.

The oil industry's expansion is complicated by the phenomenal growth in liquefied petroleum gas sales—3.9 billion gallons were sold in 1951, compared with 3.4 billion in 1950. A lot more steel is needed for facilities to handle that volume. All that adds up to this: The steel industry is having a tough time keeping up with oil and gas expansion, even though it increased its capacity to produce all types of pipe and tubing—the petroleum people take half of all output—about 43 per cent from 1948 to 1951, from 8.8 million to 12.6 million tons.

The price of crude oil is right. The need for the fuel is great. So, metalworking is helping the oil and gas industry expand, to the tune of $3 billion in 1952. Needed this year will be 15 million tons of steel fabricated into pipe, oil country goods, pumps and a myriad of other equipment items. Cover photo: Dresser Industries Inc.

Sun Oil Turns In the Scrap

Sun Oil Co.'s scrap drive is paying off. Since June, 16 million pounds of steel scrap and 140,000 pounds of copper and brass were collected in a pilot operation designed to provide guides for similar drives by the oil industry.

Sun's chief engineer, Paul D. Barton, says most of the scrap was from obsolete refinery units, buildings, storage facilities equipment.

Sun collected 6.8 million pounds of metal at its Marcus Hook refinery at a cost of $91,000. That was sold at $86,000. But over and above this, the refinery salvaged many tons of usable steel pipe, plate, shapes and other materials. An equivalent amount of scrap, Mr. Barton estimates, will be turned in by service stations, bulk plants in community drives.

Wire Rope Tagged

Supplies of wire rope used in drilling oil and gas wells are expected to increase. The National Production Authority made it a controlled material under CMP Regulation 1, effective January 1.

The NPA says that there isn't a shortage in 1-inch and larger wire rope, used in well drilling, but small diameter rope, seldom used in industry, is in tight supply. Distributers are permitted to continue to sell large rope freely; only producing mills are required allotment certifications.

1892–1952

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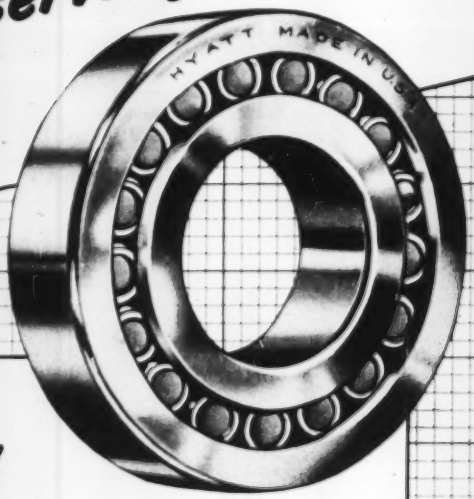

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HYATT ROLLER BEARINGS

By H. C. TUTTLE *Detroit Editor*

Mirrors of Motordom

Most 1952 models boast only minor styling and mechanical refinements. Flashy interiors, simpler grille designs distinguish most

DETROIT

THREE SCHOOLS of thought rule the auto industry with respect to 1952 models. One believes it can stand pat with the 1951 product. Another thinks a new styling note and mechanical refinements here and there are in order. And the third group makes this its year for major body and/or engine changes.

With about half the new models publicly displayed and many of the remainder already seen in "sneak" previews, it becomes obvious that a majority of the cars fall in the second category. Some of these are quite different in appearance from last year's (such as Studebaker), and others (like Pontiac) are outwardly about the same and mechanically much changed.

Interiors — All the stylists are having a field day with car interiors. Color-keying metal and upholstery, steering wheels and whatnot with exterior hues and using many lush new fabrics, they are creating effects the like of which have never before appeared in standard automobiles. Whenever sales chiefs can be induced to comment on these niceties they insist that the public demands them even though car costs suffer as a result.

Some of the other styling changes are immaterial. Redesigned hood ornaments, name plates, wheel covers, etc., come in this group. That they're "new for '52" is the only thing that can be said about them. Two years from now most people looking at cars which have this kind of model "identification" will not know what model-year car they're seeing.

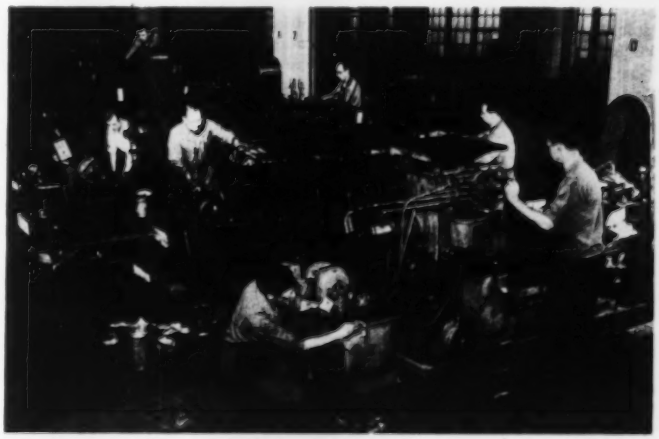
Minor But Lasting — There are some styling changes of more or less minor nature that have lasting merit. For one thing, car makers reached the diminishing returns point on number of "teeth" in the grille and concluded that satisfactory air intake was better for their product than umpty-three gleaming upright or horizontal bars. In the front-end clean-up, parking and fog lights became part of the structure, not appendages. In stop, back-up and directional lights the trend toward one housing for 1952 becomes quite universal. Stylists have had to compromise with public taste as interpreted by dealer groups in several instances and retain nonessentials such as hood ornaments and like gimmicks where their own desire was to dispense with them.

Of a more substantial nature, stylewise, is the trend back toward greater trunk capacity. In some cases this year this is accomplished by squaring off the deck lid. In others it is achieved by new space-saving hinge mechanisms or the obvious one of outside-mounted spare tires.

One-Piece Window—One of the new models will use a one-piece rear window which is almost three-sided—the most severe deformation of glass which is presently capable of commercial manufacture. One-piece curved windshields will appear in all but a small minority of 1952 cars. Even in cars whose glass area is not increased this year, the hard-top styling will sometimes be emulated by using stainless steel side pieces.

On the mechanical side, the new cars have many features of varying significance. In seeking ease of car operation, power steering and power braking are two approaches. One nonconformist automaker will completely change its method of front-wheel suspension to make wheel turning easier without benefit of the power booster. The new Hydra-Matic, available at first only in General Motors cars, is one of the best of the year's mechanical refinements. Higher horsepower ratings give flashier acceleration and, where coupled with lower rear axle ratios, achieve good, and sometimes spectacular, economy.

Race for Horsepower—A horsepower race, end of which is nowhere in sight will round another turn this year. It gets its second wind with some new concepts in carburetion and manifold design. Buick's Roadmaster, and presum-



AIR FORCE VETERANS: Aircraft machine tools, put into mothballs by the Air Force after World War II, are reconditioned on an assembly line basis at Buick Motor Division in Flint, Mich., for production of Wright J65 Sapphire jet engines. Buick received about 500 of these machines from the Air Force pool and needs about 2700 more to equip the three jet plants it has under construction

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ably some of the other large GM cars, will have a four-barrel carburetor. Muffler changes are drastic in some cases. Lower gear generation in better designed engines is reducing radiator size substantially in some of the cars.

Some of the less consequential improvements, a few of which are of the why-didn't-they-think-of-that-sooner variety, include such things as an under-the-hood transmission oil dip stick and gas tank filler tube exactly in the middle of the back. One car will have its battery back under the floor boards in the driver compartment a feature with mixed blessings. Nearly all cars this year eliminate the remote control hood release mechanism. Its elimination, one car maker says, saves $1.50. And, according to another, the gadget was ineffectual protection against unauthorized entrance to the engine compartment in most cars anyway.

Pity the Service Attendant So cleverly have the designers hidden the latch which opens the hood now that the spark plugs are reasonably safe from all but the most persistent thief, and service station men throughout the country will sport skinned knuckles and caustic vocabularies as they long for the days of single twist handles alongside the bonnet. In many cases greater attention has been given to moisture-proofing the ignition system, and in several notable instances the starting switch has been redesigned to permit more positive engagement for longer periods.

Brakes are another item undergoing extensive redesign. Greater power must be accompanied with at least equal and preferably shorter stopping distances than formerly. Larger brake surface area, thicker linings and new control linkages are ways of accomplishing this. So are relocation of brake pedals and new methods of mounting them so as to reduce reaction time. Of course, hydraulic boosters are another. Then, too, in the case of the dual-range Hydra-Matic transmission more effective use of engine braking is employed.

To Cut Or Not To Cut

To cut or not to cut—that was the question last week as the government studied the arguments of the automakers, the labor department and others and weighed the requirements of the military program against the metals supplies in sight. The auto people, the United Autoworkers, and many political figures had marshalled convincing figures in proof that a second-quarter cut would be, as General Motors' C. E. Wilson put it, "a political, economic and social crime."

Auto, Truck Output

U. S. and Canada

	1951	1950
January	645,688	609,882
February	658,918	505,595
March	802,737	610,678
April	680,281	585,707
May	695,898	732,164
June	653,682	897,852
Six Mos.	4,137,204	3,941,878
July	522,858	746,801
August	571,442	842,335
September	505,758	760,848
October	548,350*	786,012
November	480,323*	633,870
December	391,272*	671,621
Week Ended	1951	1950
Dec. 15	115,627	172,307
Dec. 22	107,186	161,033
Dec. 29	39,488	135,229
	1952	1951
Jan. 5	58,275	100,072
Jan. 12	85,000*	139,679

Sources: Automotive Manufacturers Association, Ward's Automotive Reports. *Preliminary.

When Senator Blair Moody disclosed that NPA would allocate enough steel to build 950 thousand passenger cars and 250 thousand trucks second quarter, the question suddenly became "When is a cut not a cut?" And the answer, according to the Washington interpretation, is "When it's less than expected." In Detroit, however, a minimum of 50 thousand cars are being cut out of the quarter's production. Quite possibly 200 thousand fewer cars that will be made in first quarter can be produced with the reduced copper allocation.

Auto makers were mum. It is their contention, best expressed by William J. Cronin, managing director of the Automobile Manufacturers Association, that steel and aluminum are showing signs of being in more plentiful supply. Senator Moody said that only enough copper would be allocated to build 800 thousand cars. This 20 per cent reduction from first quarter translates itself, according to Mr. Cronin, into a savings of less than three quarters of one per cent of the nation's copper supply.

The auto makers will redouble their efforts to get along with less copper per car and truck. But, according to many experts, they have about reached the limit of what they can do in the way of reducing gages in radiators, etc. From now on any major savings must be made by new methods, such as aluminum wiring and radiators, both of which are blocked from mass production by unsolved manufacturing bugs.

Reprieve on Machine Tools

While the government sought a way out of its dilemma on materials, it recognized the merits of the hardship plea which several makers had entered against ban on new machine tool deliveries after Feb. 1. Four passenger car engine programs — Dodge, Buick, Ford V-8, and Mercury—and Ford Tractor have been stalemated for lack of equipment, and a reprieve until June 1 may enable all of these to be completed or at least made feasible without interfering with military tooling.

Chrysler Sets Record Straight

Justifiably proud of its role as a tank producer, Chrysler Corp. sets this column's records straight by saying that although many of the machine tools were still being installed at the time the first heavy tank rumbled out of its uncompleted Newark, Del., plant, some of that tank's parts were made there. They were not all shipped from the Detroit Arsenal as was stated here Dec. 31. The company is prevented from revealing what components were manufactured at the facility.

Chrysler's contract for heavies is not developmental in nature. A $99 million production contract for heavies of joint Chrysler-Ordnance design, and supplemental to its medium tank contract, was awarded Chrysler last January by the Ordnance Tank - Automotive Center, Detroit.

Mr. Basic Bearing has quite a Wardrobe

With One Shield

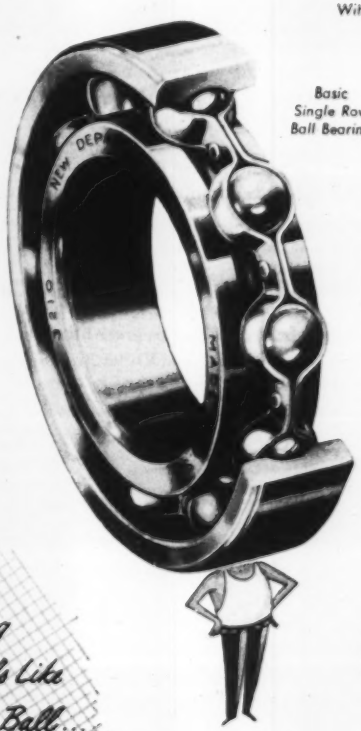
With Two Shields

With Snap Ring

With One Seal

With Two Seals

Basic Single Row Ball Bearing



The right "dress" for every job — available as accessories to New Departure's basic ball bearing.

Let us tell you more

Nothing Rolls Like a Ball...

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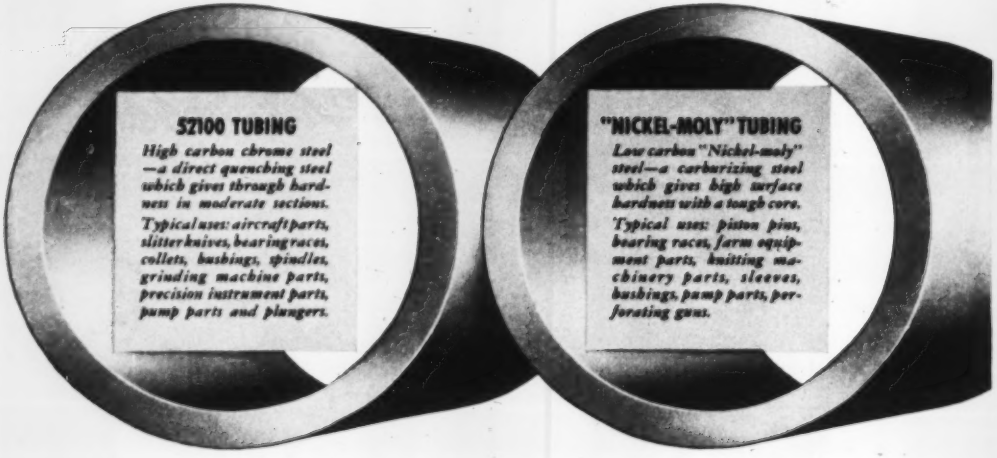
157

Immediate shipment from mill stock


52100 TUBING
High carbon chrome steel —a direct quenching steel which gives through hardness in moderate sections.
Typical uses: aircraft parts, slitter knives, bearing races, collets, bushings, spindles, grinding machine parts, precision instrument parts, pump parts and plungers.
"NICKEL-MOLY" TUBING
Low carbon "Nickel-moly" steel—a carburizing steel which gives high surface hardness with a tough core.
Typical uses: piston pins, bearing races, farm equipment parts, knitting machinery parts, sleeves, bushings, pump parts, perforating guns.

These two TIMKEN® wear-resistant steels will do 90% of your hollow parts jobs!

Next time you need alloy steel in a hurry for hollow parts, place your order with the Timken Company. Warehouse quantities of 52100 tubing and "Nickel-moly" tubing can be shipped within 24 hours, and they'll fill the bill for 90% of your hollow parts jobs.

If you need a steel that can be heat treated to file hardness and tempered back to any desired point, use Timken 52100 steel. It's a high carbon steel that has through hardenability in moderate sections. It resists wear and, in many cases, can be used in place of more expensive steels. Available in 101 sizes from 1" to 10½" O.D.

If you need high case hardness and a tough core, use Timken "Nickel-moly" steel. It's a low carbon, carburizing steel with exceptional stamina and shock absorbing qualities. Available in 52 sizes from 1⅜" to 10¼" O.D.

Used in place of bar stock, these two steels save both material and machining time. And they give you uniformity from tube to tube and order to order. For stock lists, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing

The Business Trend

Cautious optimism is consensus on '52 business as arms program moves from preparation to production. Industry recovers quickly from holiday slowdown

EVENTS so far in 1952 show no tendency to change the business patterns formed in the fourth quarter.

The slow transformation of our garrison economy from preparation to production continues with numerous dislocations but no serious fractures. Partially because of this innate resiliency, consensus on the economic outlook remains cautiously optimistic.

Defense — Half-way mark has been reached by the nation in its military build-up, says the Defense Production Administration, which sets mid-1953 as its preparedness target date. Arms production in 1952 is expected to be close to $50 billion, nearly double the '51 rate. Of two vital defense industries, DPA's Manly Fleischmann says airplane production is expected to climb 115 per cent and electronics manufacture should jump about 268 per cent over 1951.

The dominant determinant of business activity will still be defense spending. Resting on that foundation and often a direct result of it are such major props in the economy as expenditures by industry for plant and equipment. Importance of this capital goods boom (it more than made up for the 1951 consumer goods slump) is that while this type of spending remains high, general industrial activity will follow suit.

Index—First sign of industry's recovery from its slowdown over the holidays is reflected in STEEL's industrial activity index (see chart, below). In the week ended Jan. 5 the index moved up 9 points to 187 (1936-1939 = 100) but is still well below its yearly average. Freight carloadings and auto assemblies still showed effects of holiday idleness; steelworks operations and electric power output were almost back to the high marks now considered normal.

High Points of '51...

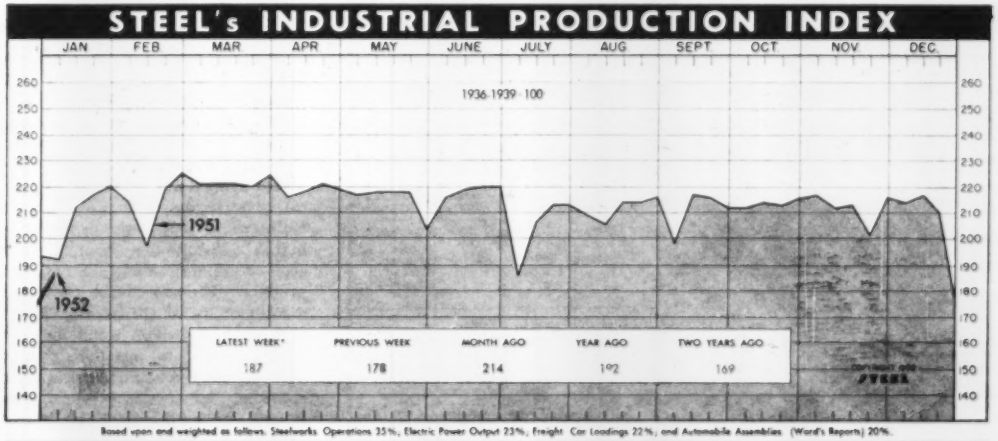
In his yearend review of the economic situation, Secretary of Commerce Sawyer gave an advance glimpse at some of the contents of the President's annual budget message. That message, due next week, reportedly will ask for a budget of over $80 billion. Mr. Sawyer points out that national output increased about 8 per cent in 1951 and that gross national product at yearend was at $327 billion. Military and related spending was figured at $34 billion (more than double 1950's total) and the inflation rise at 6 per cent. Industrial production, says Mr. Sawyer, expanded by 10 per cent. Defense spending was at an annual rate of $40 billion in the fourth quarter. Outstanding defense orders at yearend amounted to about $40 billion—leaving another $33 billion in unobligated funds. Personal income in the year was $251 billion (up $26 billion from 1950) and reached a $260 billion annual rate entering 1952.

Mills Set the Pace...

The steel producing industry has no time to rest on the laurels of its 1951 accomplishments. In the week ended Jan. 12 operations were scheduled to produce 2,041,000 net tons, a gain of 2000 tons from the preceding week and 60,200 more than a year ago. Estimated capacity now stands at about 107 million ingot tons.

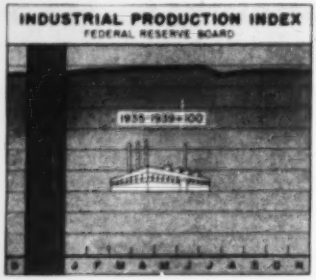
Back to Subnormal...

"Back to subnormal" might best describe last week's operations in



Based upon and weighted as follows: Steelworks Operations 35%, Electric Power Output 23%, Freight Car Loadings 22%, and Automobile Assemblies (Ward's Reports) 20%.

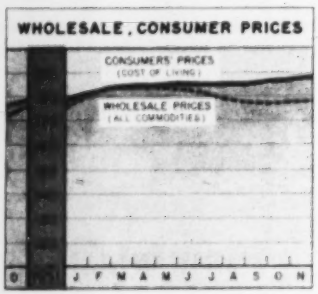
* Week ended Jan. 5



Industrial Production Index

	Total Production		Iron, Steel		Non-ferrous	
	1951	1950	1951	1950	1951	1950
Jan.	221	183	255	203	224	180
Feb.	221	180	252	201	218	190
Mar.	222	187	263	205	212	200
Apr.	223	190	264	222	210	198
May	223	195	263	226	206	197
June	221	199	261	231	204	207
July	213	196	253	228	198	202
Aug.	217	209	254	236	198	212
Sept.	219	211	257	245	201	216
Oct.	218	216	261	253	202	223
Nov.	218	215	260	246	208	226
Dec.		217		253		227
Avg.		200		226		207

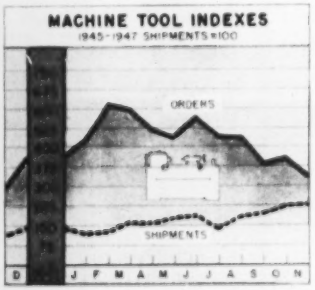
Federal Reserve Board



Price Indexes

	Wholesale (1926=100)		Consumers (1935-39=100)	
	1951	1950	1951	1950
Jan.	180.1	151.5	181.5	168.2
Feb.	183.6	152.7	183.8	167.9
Mar.	184.0	152.7	184.5	168.4
Apr.	183.6	152.9	184.6	168.5
May	182.9	155.9	185.4	169.3
June	181.7	157.3	185.2	170.2
July	179.4	162.9	185.5	172.0
Aug.	178.0	166.4	185.5	173.4
Sept.	177.6	169.5	186.6	174.6
Oct.	178.1	169.1	187.4	175.6
Nov.	178.3	171.7	188.6	176.4
Dec.		175.3		178.8

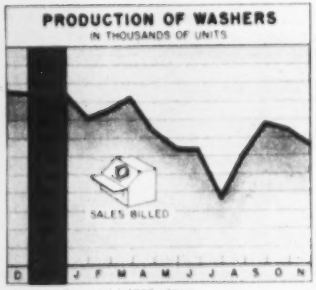
U. S. Bureau of Labor Statistics



Machine Tool Indexes

	New Orders		Shipments	
	1951	1950	1951	1950
Jan.	475.4	99.7	114.3	52.8
Feb.	615.5	89.2	123.8	56.1
Mar.	599.3	107.4	158.9	75.3
Apr.	516.1	98.9	157.7	61.6
May	483.0	116.4	175.1	82.5
June	358.8	124.1	182.8	91.9
July	499.6	253.1	144.7	68.3
Aug.	488.9	305.1	178.9	95.7
Sept.	380.2	280.6	189.8	101.6
Oct.	403.9	289.6	221.3	100.9
Nov.	332.6	291.9	225.7	110.9
Dec.		410.1		135.7

National Machine Tool Builders' Assn.



Household Washers
Sales Billed—Units

	1951	1950	1949
Jan.	321,092	275,376	172,400
Feb.	341,328	342,967	201,300
Mar.	398,455	423,502	242,500
Apr.	292,193	333,072	192,500
May	253,942	304,640	211,700
June	253,119	325,217	260,700
July	139,779	282,261	200,900
Aug.	239,051	381,452	323,789
Sept.	313,736	424,043	357,281
Oct.	257,210	439,524	333,728
Nov.	262,484	376,964	298,717
Dec.		377,013	237,591
Totals		4,289,931	3,033,106

American Home Laundry Mfrs. Assoc.

Charts Copyright 1952, STEEL

Issue Dates of other FACTS and FIGURES Published by STEEL:

Construction	Dec 10	Gear Sales	Dec 17	Ranges, Elec.	Dec 24
Durable Goods	Oct 8	Gray Iron Castings	Dec 31	Refrigerators	Dec 24
Employ., Metalwkg.	Nov 12	Ironers	Dec 17	Steel Castings	Dec 31
Employ., Steel	Dec 10	Malleable Castings	Dec 31	Steel Forgings	Dec 31
Fab. Struc. Steel	Nov 12	Pumps	Dec 10	Steel Shipments	Dec 17
Foundry Equip.	Dec 17	Purchasing Power	Oct 8	Vacuum Cleaners	Dec 3
Freight Cars	Dec 31	Radio, TV	Dec 10	Wages, Metalwkg.	Oct 22
Furnaces, Indus.	Dec 10	Ranges, Gas	Dec 24	Water Heaters	Dec 24

the auto industry. Comparisons with year-ago figures will make weekly totals look sickly, but after two 3-day work weeks the automakers were happy to top the 100,000-unit mark again. *Ward's Automotive Reports* calculates total U. S.-Canadian car and truck production at 58,257 units in the week ended Jan. 5 and 39,488 (a five-year low) in the week ended Dec. 29. Preliminary reports on 1951 auto and truck production by *Ward's* puts total 1951 output at 6,749,415 units (5,333,848 were cars) in the U. S. and 411,521 in Canada.

New Orders Slide. . .

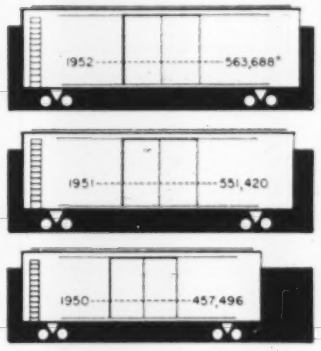
Manufacturers' shipments and inventories during November were maintained at about the October rate, while both new and unfilled orders declined slightly, the Commerce Department reports. Inventory accumulation, slowed in recent months, came to a virtual halt in November. Unfilled orders were off for the third successive month as the value of new orders (down more than 5 per cent) failed to balance sales. Durable goods producers' sales were up 1 per cent, but were offset by a minor dip in nondurables sales. Indications point to a slowing, if not reversal, of the downtrend in new orders in January, if not in December.

No Construction Slowdown. . .

Depressing effects of restrictions didn't keep new construction expenditures from topping 1950's. Labor Department figures show a 7 per cent increase in 1951 to $29.9 billion, but the additional dollars spent were absorbed in higher construction costs, leaving physical volume about equal to 1950's. Associated General Contractors of America says that total construction, including general maintenance and repairs, approximated $39 billion—about 12 per cent of the nation's gross national product. The association predicted a total of up to $37 billion (about $28 billion of which would be new construction) is possible during 1952. Heavy construction awards, recorded by *Engineering News-Record*, added up to $13.6 billion in 1951, up 10 per cent from 1950.

Carloadings Will Climb

(Weekly Averages, First Quarter)



* Estimated by the 13 regional Shippers Advisory Boards; 1950, 1951 figures from Association of American Railroads

Industrial construction showed the most spectacular increase in the year: At $4.1 billion, that category was 145 per cent over 1950.

Trade Indicator To Climb. . .

Loading of revenue freight totaled 40,497,386 cars in 1951, reports the Association of American Railroads. That's 4.1 per cent above 1950. New records were set in both train loads and speeds. The average freight train's output was equivalent to moving 21,700 tons of freight one mile in an hour. First quarter loadings, forecast by the 13 regional Shippers Advisory Boards, will expand to 7,327,951 cars (see pictogram). Heaviest gains are expected in ore and concentrates, machinery, iron and steel, coal and coke.

Layoffs High, Hiring Low. . .

Factory workers were laid off in November for the fifth consecutive month at one of the highest rates for the season during the past decade. Though hiring was also at low ebb, overall factory employment was at 15,851,000. Quit rate throughout the fall was lowest in ten years too.

Trends Fore and Aft. . .

Installed capacity of electric utility generating plants passed the 75 million kilowatt mark for the first time in November . . . Consumer instalment credit outstanding increased by $60 million during November, bringing total outstanding going into December to $13.3 billion . . . Employment next summer will hit the 63 million mark, says the Employment Security Bureau . . . The government finally confirmed it: Manufacturers' profits slumped 15 per cent before taxes and 23 per cent after taxes in the third quarter. Fourth-quarter returns won't be nearly so dismal.

BAROMETERS OF BUSINESS

	Latest Period*	Prior Week	Year Ago
INDUSTRY			
Steel Ingot Output (per cent of capacity)[2]	102.0	101.5	98.0
Electric Power Distributed (million kwhr)	7,149	6,922	6,202
Bituminous Coal Output (daily av.—1000 tons)	1,296	1,767	1,589
Petroleum Production (daily av.—1000 bbl)	6,204	6,206	5,768
Construction Volume (ENR—millions)	$159.1	$173.5	$154.2
Automobile, Truck Output (Ward's—units)	58,275	39,488	100,072
TRADE			
Freight Car Loadings (unit—1000 cars)	590[1]	502	662
Business Failures (Dun & Bradstreet, number)	124	163	144
Currency in Circulation (millions)[3]	$29,143	$29,403	$27,685
Dept. Store Sales (changes from year ago)[3]	+11%	+2%	+20%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$17,897	$15,474	$17,923
Federal Gross Debt (billions)	$259.4	$259.2	$256.2
Bond Volume, NYSE (millions)	11.2	11.1	20.9
Stocks Sales, NYSE (thousands of shares)	5,700	5,689	14,351
Loans and Investments (billions)[4]	$74.9	$74.8	$71.8
United States Gov't. Obligations Held (billions)[4]	$32.5	$32.6	$33.7
PRICES			
STEEL's Weighted Finished Steel Price Index[5]	171.92[1]	171.92	167.89
STEEL's Nonferrous Metal Price Index[6]	234.9	234.9	248.7
All Commodities[7]	177.2	177.3	177.9
Metals and Metal Products[7]	190.9	190.9	187.4

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1951, 1,999,035. [3]Federal Reserve Board. [4]Member banks, Federal reserve system. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1926=100.

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- COLD FINISHED BARS—Rounds Hexagons, Flats and Squares
- ALLOY COLD FINISHED BARS
- HOT ROLLED BARS—Rounds Flats and Angles
- STRUCTURALS—Channels Angles and Beams
- HOT ROLLED PLATES
- ABRASION RESISTING PLATE
- HOT ROLLED AND COLD ROLLED SHEETS
- HOT ROLLED STRIP
- YOLOY PRODUCTS—Angles Flats, Plate and Sheets
- DEFORMED REINFORCING BARS
- WELDED WIRE MESH
- SOFT BLACK ANNEALED WIRE
- BRIGHT BASIC WIRE AND WIRE RODS
- WIRE ROPE AND FITTINGS

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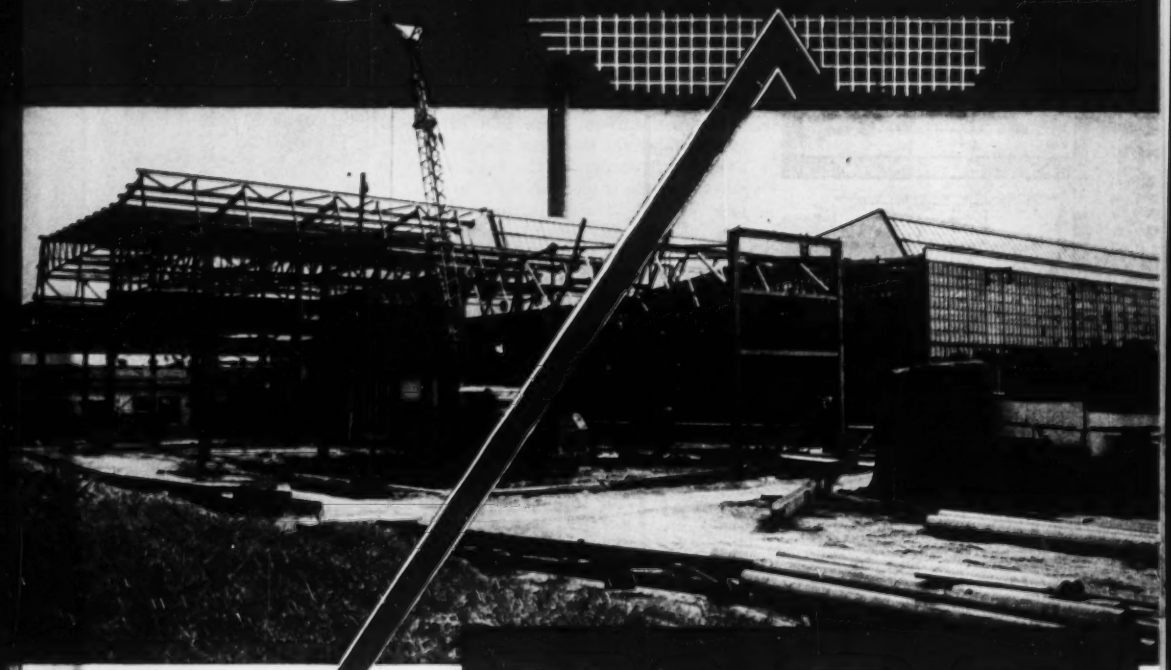
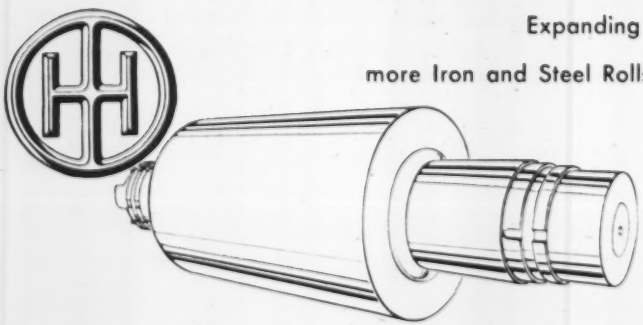
Stepping UP Steel Production



with more Ohio Rolls



Expanding our machining facilities to produce more Iron and Steel Rolls is Ohio Steel's part in STEPPED-UP steel making capacity.

THE OHIO STEEL FOUNDRY CO.

LIMA, OHIO — Plants at Lima and Springfield, Ohio

ANTHONY M. RYERSON
. . . gen. mgr.-sales, Inland Steel

Anthony M. Ryerson was made general manager of sales, **Inland Steel Co., Chicago.** He succeeds **John F. Smith Jr.** who was elected vice president-sales. Appointed assistant general managers of sales are **Benton J. Willner** and **Clarence L. Holmberg. Kenneth J. Burns** succeeds Mr. Willner as manager of sales, sheet and strip division, and is succeeded as district sales manager, Chicago district sales office, by **R. M. Buddington. Harry R. Johnson** and **James C. Fausch** were appointed assistant managers of sales, sheet and strip division; **Derrick L. Brewster,** assistant manager of sales, bar and semi-finished division; and **John G. Mack Jr.,** assistant to the district sales manager, Chicago.

Burton E. Drury Jr. was named sales manager of **United Platers Inc.,** Detroit. He formerly was with Wilson Foundry & Machine Co. as sales manager.

BURTON E. DRURY JR.
. . . new sales mgr. of United Platers

DUDLEY B. ROBINSON
. . . Torrington Mfg. V. P.-sales

Torrington Mfg. Co., Torrington, Conn., elected **Dudley B. Robinson** vice president-sales. He joined the company in 1949 as sales director of the air impeller division and advanced to general sales manager.

A. J. Fisher was appointed general manager of **Bethlehem Steel Co.'s** Johnstown, Pa., plant to succeed **R. E. Hough,** retired after more than 46 years in the steel industry.

Alfred J. Fava was named sales director, General Products Division, **American Machine & Foundry Co.,** New York. **J. J. Cranmore** was appointed sales manager, lowerator department for the division.

E. A. Schwartz was appointed assistant vice president in charge of steel operations for **Republic Steel Corp.,** Cleveland. He succeeds **M. E. Goetz** who becomes manager of Republic's Cleveland district, the position formerly held by Mr. Schwartz. **Frank C. Farrell,** manager of the Buffalo district, retired to work as a steel consultant for the company in the Buffalo operating and sales department. He is succeeded as Buffalo manager by **Harry L. Allen Jr.,** formerly assistant district manager. **C. W. Barrett** of Cleveland succeeds Mr. Allen. **B. F. Handloser,** works manager for many years of the company's Dilworth-Porter Division in Pittsburgh, succeeds Mr. Barrett as chief roll engineer. **George G. Walker** was named development engineer of the seamless tube mill now under construction at the South Chicago plant. He was superintendent of the electric-weld tube mill at Republic's Youngstown plant for nearly 20 years.

T. F. FLEMING
. . . gen. mgr. of Morrison Engineering

T. F. Fleming was appointed general manager, **Morrison Engineering Corp.,** Cleveland, and heads the metallurgical department of the company. He formerly was supervisor of the heat treating department, National Screw & Mfg. Co.

Gen. E. R. Quesada (ret.) was elected vice president and director of **Olin Industries Inc.,** East Alton, Ill.

J. H. Treanor, formerly vice president, **Mystic Iron Works,** Everett, Mass., subsidiary, Eastern Gas & Fuel Associates, Boston, was elected president and director. **R. M. Folsom,** formerly president, becomes chairman of the board. **F. S. Holway** continues as sales manager and **E. W. Zimmerman** becomes vice president.

A. L. Meserve was appointed superintendent of **Chrysler Corp.'s** new engine plant in Trenton, Mich. For the last six years he was superintendent

A. L. MESERVE
. . . supt. of Chrysler's engine plant

R. E. WALDO
gen. mgr., New Departure Div.

W. H. WISE
Bryant Heater sales director

of Plant 4 in the Highland Park plant.

R. E. Waldo, affiliated with General Motors Corp. for the last 25 years, was appointed general manager of the **New Departure Division,** Bristol, Conn. He succeeds **Milton L. Gearing,** who severed connections with the division to engage in business for himself.

McCormick Steel Co., Houston, elected **C. L. Williams** executive vice president; **D. D. Napier Jr.,** secretary-treasurer; and **W. S. Parkinson,** vice president in charge of the Lubbock Division.

Dow Chemical Co., Midland, Mich., appointed **Fred A. Koch** of the New York office as special assistant to the general sales manager. With establishment of two new Dow international subsidiaries, **Clayton S. Shoemaker,** Dow's former eastern sales manager, resigned his post to head the new organizations, and the positions of eastern sales manager and assistant eastern sales manager have been discontinued. Mr. Koch held the latter position.

Vernon N. Ferguson was named chief industrial engineer, **Texas Engineering & Mfg. Co. Inc.,** Dallas.

J. H. King, vice president, **Babcock & Wilcox Co.,** New York, was named to head the reorganized boiler division, and **Luke E. Sawyer** and **Edward A. Livingstone,** president and vice president, respectively, of the recently absorbed subsidiary, B&W Tube Co., were elected vice presidents of Babcock & Wilcox.

H. M. Arrick was appointed district sales manager in St. Louis for **Armco Steel Corp.** He succeeds **N. L. Pierson,** retired.

W. H. Wise was appointed director of sales for **Bryant Heater Division,** Affiliated Gas Equipment Inc., Cleveland. He has been assistant director-sales for the last year, and now succeeds **J. N. Crawford,** appointed assistant to the president of Affiliated Gas Equipment.

C. M. Allabach was named secretary-treasurer of **Valley Mould & Iron Corp.,** Hubbard, O., to succeed **Julian W. Gault,** retired after 32 years with the company. **Charles E. Swab,** a vice president, was named a director to replace Mr. Gault. **N. F. Womer** succeeds Mr. Allabach as auditor, while **W. C. H. Ramage,** assistant vice president, was made assistant secretary.

Walter E. Shoff was appointed director of purchases, **Walker Mfg. Co.,** Racine, Wis., to replace **Carl C. Nelson,** Walker vice president, who retired after 37 years' service. Mr. Shoff has been with Caterpillar Tractor Co., where for the last ten years he was in charge of the steel and forging purchasing division. **L. E. Coffin Jr.,** Walker purchasing administrative assistant for the last seven years, was named purchasing agent for the company.

Robert C. Mercer joined **Pennsylvania Salt Mfg. Co.,** Philadelphia, as sales engineer on corrosion resistant products. **J. Ralph Macon** was appointed sales and service specialist in the ordnance field. **R. A. Snyder** and **K. W. Montfort** were named district sales managers for Pennsylvania Salt Mfg. Co. of Washington. Mr. Synder heads the industrial cleaners division and the Los Angeles sales office. Mr. Montfort is in charge of the agricultural chemicals division, and continues to make headquarters in Portland, Oreg.

Springs Inc., Chicago producer of spring and metal specialties, elected **H. J. Harms** as vice president. He previously was associated with L. A. Young Spring & Wire Co. in Detroit.

T. R. Farley, a vice president of **Caterpillar Tractor Co.,** Peoria, Ill., will establish a temporary office in York, Pa., as construction of the 360,000 sq. ft. plant there gets under way. Production will center around replacement parts of Caterpillar products. **William L. Naumann,** assistant general factory manager at Peoria, succeeds Mr. Farley as general manager of the earthmoving equipment plant at Joliet, Ill.

Carl S. Hallauer was elected executive vice president of **Bausch & Lomb Optical Co.,** Rochester, N. Y. He has been vice president since 1932, and is also president of the firm's Canadian and South American companies.

William A. Ehresman was named director of purchases for **Budd Co.,** Philadelphia. He succeeds **Francis S. White,** retired, who headed the pur-

WALTER E. SHOFF
director of purchases, Walker Mfg.

WILLIAM A. EHRESMAN
directs purchases at Budd Co.

ROUND AND SHAPED TUBING
.010" to ½" O.D. Max.
Certain Analyses .035" max. wall to 1⅜" O.D.
Available in:
Carbon Steels:
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HOLE STORY
by Superior

Chapter 4

Putting the Squeeze on Tubing —to End Bends!

Whether you use fine small tubing as a medium for transporting fluids or gases—or fabricate it into component parts—you want it straight as an arrow to start. That's where the machine pictured above comes in.

Commercial straightness is easily attained with Superior's numerous types of specialized straightening equipment.

In the normal course of tube drawing operations, unequal stresses are set up and the resultant tube has bends and bows which must be removed.

All these stresses are equalized in one operation. The tube is straightened and the end result is a better product for you.

To produce the world's best tubing we inspect and check many times, mechanically and metallurgically. We use microscopes to check grain structure, and keen-eyed inspectors to detect surface scratches, splits and pits. Pressure tests find any possible flaws in the walls. A continuing program keeps every Superior production worker aware of his part in the quality picture.

What does this mean to you?

It means you get fine small tubing that will do the toughest jobs better. Right now (because of Defense Orders and metal shortages) we may not be able to fill all of your tubing requirements, but it will pay you to check with your Superior distributor—he may have enough tubing in stock to help you. Always specify Superior Tubing and you'll always be right.

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Certain analyses (.035" max. wall)
Up to 1⅜" O.D.

S. S. CORT
. . . Bethlehem Pacific gen. sales mgr.

FRED FRIEDLIEB
. . . sales mgr., Admiral Die Casting

EDWARD R. ANDERSON
heads American Forge Division

chasing department for the last 18 years.

S. S. Cort was promoted from assistant to general manager of sales for **Bethlehem Pacific Coast Steel Corp.** with headquarters in San Francisco. **Colby Howe** transfers from Seattle to become manager of bolt and nut sales, San Francisco, to succeed **Frank J. Anderson**, advanced to manager of sales, San Francisco district. **J. G. White Jr.** was promoted to assistant manager of sales for the Seattle district.

Baker-Raulang Co. appointed **Maynard W. McMillan** representative in southwestern Ohio for its line of Baker industrial trucks. His headquarters will be in Cincinnati.

John J. Lynch joined the engineering staff of **American Tank & Fabricating Co.**, Cleveland, to serve as assistant metallurgist and sales engineer.

Fred Friedlieb was appointed sales manager, **Admiral Die Casting Corp.**, Chicago. He previously was sales representative for R. H. Campbell Co., Chicago, and was buyer at Motorola Inc.

Dr. Kent R. Van Horn succeeds **Dr. Francis C. Frary**, retired, as director of research at **Aluminum Co. of America**, Pittsburgh. Associated with Alcoa for 22 years, Mr. Van Horn was associate research director.

W. N. Stephenson was promoted to district sales manager, New York territory, for **Stanley Works**. He succeeds **W. L. Hall**, who resigned.

Laird H. Hansen was appointed assistant sales manager, Chicago district, **A. M. Castle & Co.**

Taylor-Wharton Iron & Steel Co., Cincinnati, appointed **Charles P. Moeller** sales manager, trackwork division. He succeeds **R. F. Gordon**, retired.

Edward R. Anderson was appointed president, American Forge Division, **American Brake Shoe Co.**, New York, and **William E. Crocombe** was made assistant to the chairman of the company. Mr. Anderson was a vice president of Brake Shoe & Castings and Kellogg Divisions, and was located in San Francisco since 1941. Mr. Crocombe, president of American Forge Division for 28 years, has reached retirement age, but continues to be available for special assignments by the chairman of the board.

William H. Clark was appointed general purchasing agent, **American Locomotive Co.**, New York. He succeeds **W. K. Farrell**, retired. **James H. Link** was named executive assistant to the president.

George Williams was named quality control manager, manufacturing division, **Pacific Airmotive Corp.**, Burbank, Calif., to succeed **Felix H. Tevis**, promoted to administrative engineer.

OBITUARIES...

Lewis A. Hastings, 64, advertising manager, **Heald Machine Co.**, Worcester, Mass., died Dec. 21. He had been associated with Heald for 43 years, 37 years of which were in the advertising department.

C. D. Rockwell, chief engineer, **Ohio Locomotive Crane Co.**, Bucyrus, O., died of a heart attack Dec. 28.

Herbert P. Schramp, 55, general traffic manager for **Aluminum Co. of Canada Ltd.**, died Dec. 22 in Montreal.

Willard D. Hosford Sr., 69, former vice president, **John Deere Plow Co.**, died Dec. 25 in Omaha, Nebr.

John J. Rittenhouse, 61, St. Paul district manager, **United States Steel Supply Co.**, died Dec. 25.

R. S. McKeage, 67, head of the engineering department, **Speedway Mfg. Co.**, Cicero, Ill. until retirement in 1950, died Dec. 24.

Charles C. Reilly, 57, assistant manager-sales, New York office, **Youngstown Sheet & Tube Co.**, died Dec. 26.

Rufus F. Harrington, 61, chief metallurgist and general manager, **Hunt-Spiller Mfg. Corp.**, subsidiary, A. S. Campbell Co., Boston, died Dec. 29.

John K. Hough, 60, director of advertising for **Goodyear Tire & Rubber Co.**, Akron, since 1937, died Dec. 29.

Frank A. Green, 53, vice president and sales manager, **Chicago Steel & Wire Co.**, died Dec. 21 in New York.

Howard C. Mull, 63, vice president-sales, **Warren Tool Corp.**, Chicago, died Dec. 21.

Wickham Harter, 58, sales manager of mechanical electronic products, Centralab Division, **Globe-Union Inc.**, Milwaukee, died Jan. 2.

James C. Frederick, 61, assistant to the vice president, **Bethlehem Steel Co.**, Bethlehem, Pa., died Dec. 28.

J. M. Thompson, 53, division manager at Ft. Worth, Tex., for **National Supply Co.**, died Dec. 26.

R. A. Metcalf, 42, sales manager, **Miller Electric Mfg. Co.**, Appleton, Wis., died of a heart attack Dec. 20.

INSUL-MASTIC vapor barrier keeps insulation dry

Here's what happens when insulation is improperly coated. This became watersoaked. The resultant rust still clings to it.

Inadequately weatherproofed insulation leads to trouble . . . trouble that can be averted by Insul-Mastic Coatings.

In more and more industrial plants, engineers are replacing their watersoaked insulation . . . using non-absorbent Insul-Mastic Type "D" . . . and in places where more insulation is required, new, dry conventional insulation is being protected with Insul-Mastic vaporseal and glass membrane.

Recently in a large plant the steel shells of huge fractionation towers were very badly rusted and pitted because of watersoaked insulation. An inferior coating over the insulation had permitted moisture and rain to penetrate. To prevent further damage to the shells, the insulation had to be removed.

Where temperatures did not exceed 225° F., Insul-Mastic Type "D", the spray applied cork filled, non-absorbent insulation, was applied. Where temperatures exceeded this figure, standard thermal insulation was applied and sealed with Insul-Mastic vaporseal and glass membrane.

Engineers are preventing this situation from occurring in their plants by specifying Insul-Mastic high quality, homogenized Coatings, when working out the plans for the insulation and protection of new units and equipment.

There is an Insul-Mastic applicator near you. Write for his name today and check the condition of your insulation now!

Think first of the coatings that last!

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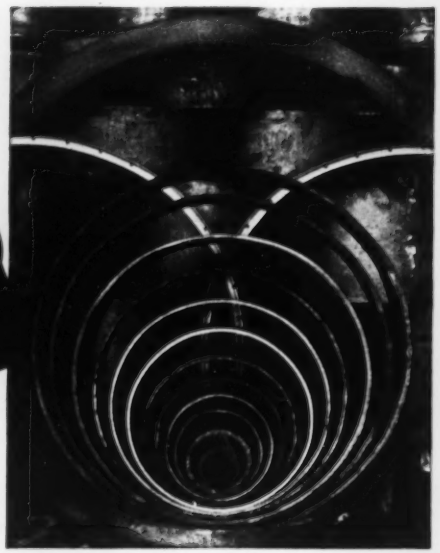

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110 DIETZ ROAD

Production AND Engineering
NEWS AT A GLANCE

MYSTERY OF THE WHISKERS—Researchers are probing the growth mysteries of metallic filaments or "whiskers" in the form of single or twinned crystals which sometimes cause trouble in the operation of telephone equipment. The original idea that the whiskers grow only on cadmium-plating is disproved. They can grow on any electroplated surface, particularly on parts shielded from air, and even on solid metals. Usually, whiskers are not found until months after the part is electroplated, but it is possible by increasing the ambient temperature to accelerate their growth in a matter of weeks. The filaments are flexible and move in the slightest air current. Actual mechanism of their growth remains unexplained.

ALUMINUM FORMED FASTER—Twelve years ago, designers and production men would never have dreamed of the variety of shapes now being extruded and forged from aluminum. Refinements in those forming techniques are making possible economies in production time and metal consumption as well as permitting advanced design. In combined extruding plus forging, instead of using a rectangular or round piece of forging stock, a rough shape is extruded similar to the final forged shape. Forging itself is simplified because it can be done in fewer steps, possibly saving a pre-die. Flow of metal within the die is improved, producing a better forging. p. 54

30-TON BONUS—Introduction of oxygen in the Bessemer converter is helping National Tube Co. beat all past records for this fastest of steelmaking processes. The new pace: Thirty tons of steel in 9 to 10 minutes, 1 or 2 minutes less than the normal time. That means a bonus of 30 tons of steel every 12 to 15 blows, 60 extra tons for each converter in an 8-hour day.

STRAIGHTENS KINKS—Removing waves, bends and kinks from thin metal rods or very small diameter tubing used to cause jewelers and instrument makers untold grief. Now they are using a rotary straightener to do the job. The machine is only 22 inches long, 19 inches wide and 8 inches high. Two 1/6-hp motors power the unit.

ELECTROLYTIC CUTTING—Successful sectioning of metal bars by electrolytic methods is being carried on at Columbia University under a grant from AEC. The process consists of making the specimen to be cut the anode in an electrolytic cell and using an appropriate electrolyte and cathode assembly. Flatness of the cut surface is produced by a novel design of cathode assembly, the principal invention of the process. Steel bars ⅝-inch in diameter have been cut in about 24 hours. Cut surfaces are comparable in flatness and smoothness to results attained by moderately fine machining methods. Why electrolytic cutting? To safeguard personnel against the hazard of machine cutting metals exposed to high levels of atomic radiation.

DISINTEGRATION BOOMS—Value of metal disintegrating as a production and salvage tool is just beginning to dawn on industry. The process is currently used to cut Stellites, carbides and tool steels which are traditionally tough to drill, cut or shape. Ratio of cutting speed of these metals is from ten to one to 50 to one faster than the old methods. One-quarter inch Carboloy is drilled in 5 minutes, ⅜-inch Stellites in 60 seconds and ⅜-inch broken taps are removed in less than 3 minutes. p. 60

MACHINERY GOES UNDERGROUND—Underground storage for defense production machines will be provided by a 14-acre cave near Atchison, Kans., rented by the Army Ordnance Corps. No heating or dehumidifying is necessary because the cave offers a constant temperature of 63 to 65°F and a relative humidity of 75 per cent. Based on gross storage space of 650,000 square feet, annual rental and maintenance costs 7½ cents per foot, as compared to about 50 cents per foot for commercial warehouse space.

BORON STEELS—10 MILLION TONS?—Ten million tons of boron alloy steels annually—that's the projected production figure as these substitutes for high nickel, moly steels gain in popularity. Now well beyond the development stage, boron steels are finding widespread applications throughout the automotive and allied industries. The melt for December, 1951 was 44,000 tons, or 9 per cent of the total alloy steel output. It'll be more in the coming months. p. 66

ERSATZ STRUCTURALS—A new high-strength structural steel containing 0.9 per cent manganese is used in a recently completed welded bridge across the Rhine. No copper, chromium or molybdenum is added. A novel deoxidizing method is supposed to be responsible for the steel's improved quality. Center span of the bridge, just short of 700 feet, is one of the widest for which welded plate girders are used.

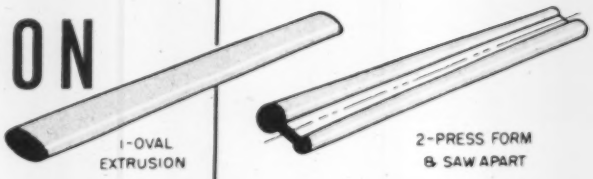
Metalworking Outlook—p. 17 *Market Outlook—p. 93*

EXTRUSION plus FORGING

—Simplifies Aluminum Forming

Economies in production time and metal consumption are resulting from improved methods of shaping aluminum. In one unusual combination of extrusion and forging, machining is cut 84 per cent and metal waste reduced 98.6 per cent

By G. W. BIRDSALL
Reynolds Metals Co.
Louisville, Ky.



ADVANCES made since 1940 in the extrusion and forging of aluminum, greatly extend the usefulness of the metal and introduce entirely new concepts both in design and production methods.

For example, Fig. 1 shows a unique production method developed to make tapered wing spar caps 19 feet long from high-tensile aluminum alloy. When machined from a 207-pound piece of rectangular bar stock, the original production method, 145 pounds of metal had to be cut off, requiring 85 manhours.

Cuts Metal Waste — The new method requires removal of only 2 pounds of stock to finish the forging, saves 143 pounds of valuable alloy and thereby reduces metal waste 98.6 per cent. Instead of 85 manhours machining time, the new technique outlined in Fig. 3 requires only 5, a saving of 84 per cent in machining.

To get balanced forging forces, the process produces spar caps in pairs tapering in opposite directions so the work done on the metal forging is uniform from end to end. First an oval section is ex-

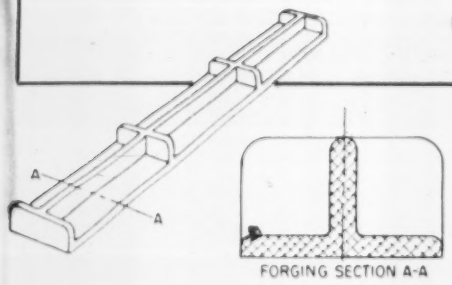


Fig. 2 (left)—Pre-extrusion simplifies forging operations, produces better flow of metal. Here, instead of using a rectangular or round piece of forging stock, a rough shape is extruded similar to the final forged shape desired. Forging itself can be done in fewer steps

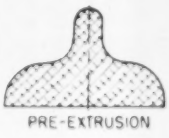
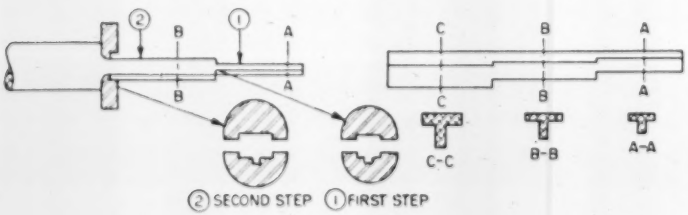


Fig. 3 (below) — Split dies changed during extrusion permit varying cross-section size and shape throughout length of extruded member



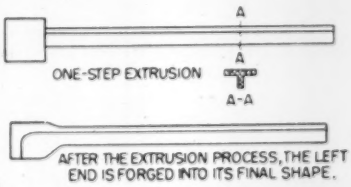


Fig. 4—This process is a modification of the stepped extrusion method shown in Fig. 3. In this case, only one step is employed, subsequently forged to produce the final shape

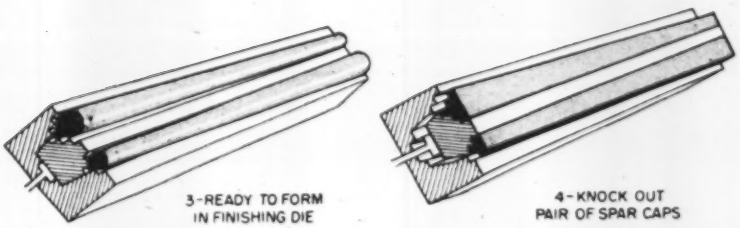


Fig. 1 — Unique combination of extrusion and forging shown here reduced metal waste 98.6 per cent, cut machining 84 per cent (1) Oval extrusion, (2) Press form and saw apart, (3) Ready to form in finishing die, (4) Knock out pair of spar caps

truded. This then is press-formed to two opposite-tapering members which are sawed apart and finish-forged in the double die. Two parts are produced simultaneously, using a 16,500-ton hydraulic forging press.

Extrusion is combined with forging to advantage in producing the shape shown in Fig. 2. Here instead of using a rectangular or round piece of forging stock, a rough shape is extruded similar to the final forge shape desired. Then forging itself is simplified because it can be done in fewer steps, possibly saving necessity of pre-die.

By providing a more suitable shape, the flow of metal within the die during forging can be improved, producing a better forging and possibly a reduction in forging time. Closer tolerances can usually be obtained, also.

Stepped Extrusions — Extrusion can be combined with forging in other ways, especially when using stepped or tapered extrusions. Most extrusions retain the same cross-sectional shape and dimensions throughout their entire length. However, designers frequently need shapes whose cross-sectional area varies to provide maximum bending moment. The stepped extrusion meets this requirement.

Using split dies as shown in Fig. 3, the press is stopped and dies changed during extrusion, producing a part whose cross-sectional size and shape varies throughout its length according to the dies used. Fig. 3 illustrates such a part made with three dies. Sections can be extruded which include asymetrical steps, since shape of the part can also be varied as well as the dimensions.

Fig. 4 shows how a simple one-step extrusion is combined with a forging operation. Important savings in metal and machining are obtained, and the fiber structure can be developed to provide increased strength.

Tapered Extrusions — Development of tapered extrusions offers yet other important design and production economies. Taper extruding is a refinement of the stepped extrusion process. It provides the answer to the design engineer's demand for a shape with a uniformly decreasing area.

When forming hollow parts, the extrusion process employs an internal mandrel. By using a tapered mandrel, it is possible to extrude a tube with tapered walls as shown in Fig. 5. Cutting away the unwanted side walls of this tube (see Fig. 6) then produces the two tapered members desired. Thus by use of a tapered mandrel, moved through the die opening during extrusion, wide changes in width, thickness and shape of the member can be obtained throughout its length.

This method can be combined with one-step extrusion to greatly simplify the production of parts like that shown in Fig. 7. It is evident that performing parts by step or taper extrusion, or both, before forging will reduce the number of forging operations required and may eliminate blocking operations entirely.

Bigger Forgings Made — Availability of large hydraulic forging presses has permitted great strides forward in production of large aluminum forgings. Large forgings

Fig. 5—Advancing a tapered mandrel through the die opening during extrusion varies the inside dimensions of the extruded part. Thus with outside dimensions remaining constant throughout its length, wall thickness is controlled as desired

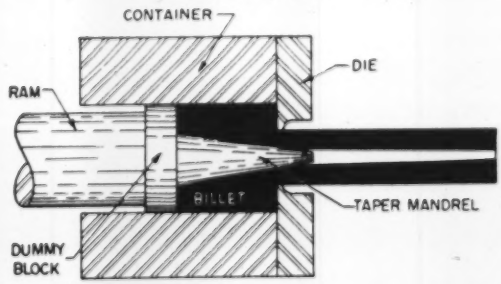
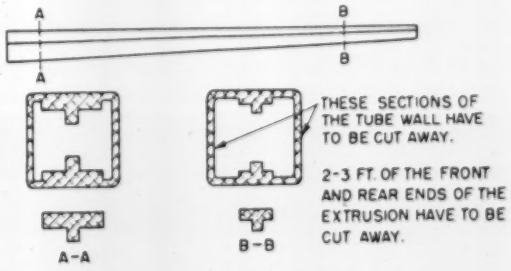


Fig. 6—Using tapered mandrel shown in Fig. 5, tube walls can be tapered. Then when unwanted side-walls are cut away, tapered sections are obtained



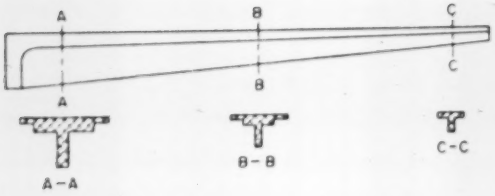


Fig. 7 (left)—One-step extrusion combined with a tapered extrusion and the result forged to produce final shape shown

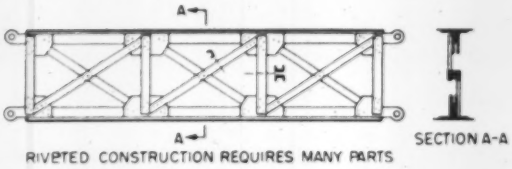
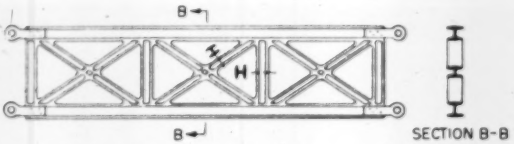


Fig. 8 (right) — Riveted construction shown here required 32 parts; forging at bottom produced same girder as a single part and tripled output



are desirable from several important standpoints.

For many years, engineers designing small parts for maximum strength have turned to forgings because the forging process works the metal, changing the original cast structure to a wrought structure with higher mechanical properties. Also the fiber, or grain flow, of the part can be so arranged as to produce still greater strength. Designing engineers want to use larger and larger forged parts to avoid the problems inherent in riveting, bolting, or welding an assembly of smaller parts.

Fig. 8 is an excellent example of the advantages inherent in large aluminum forgings for aircraft and other applications where the parts are subjected to high stress. The unit in Fig. 8 is an aluminum lattice girder for an airplane wing spar. Riveted construction shown at the top required 32 structural elements to do the same job done by the single forging below. This is possible because the forging utilizes metal much more efficiently by eliminating excess material formerly required for overlaps at the joint areas.

It is evident that this change in production from a riveted assembly to a single forging made possible important economies in reduced machining work, joint preparation, welding, riveting, and similar operations. Manhours required to produce this part were reduced some 67 per cent, enabling the output per 1000 manhours to be tripled easily.

Not only that, but the part now has better fatigue resistance because it is designed to avoid any stress concentrations. This, in turn, provides a greater strength-weight ratio and assures a higher factor of safety.

Mint of Milling Facts

Theory and practice of metal cutting by the milling process are thoroughly covered in a book titled, "A Treatise on Milling and Milling Machines." The third edition on this subject published by Cincinnati Milling Machine Co., Cincinnati, is presented in response to numerous requests from metalworking shops, technical schools and universities.

Like its predecessors, this volume describes the most advanced types and applications of milling machines, milling attachments, cutters and cutting fluids, as well as unique design and types of fixtures used in tooling for production. Based on information from the company's engineering staff, the book was compiled by Mario Martellotti, development engineer.

Beginning with the definition of a milling machine, the book develops the functions of various machine components and types of machines used to perform a variety of metalworking jobs. Separate chapters are devoted to accessories, cutters, cutter materials, cutter elements and the sharpening and care of milling cutters providing a complete discussion of these subjects.

Topics like the milling process; chip formation, surface finish and cutting fluids; power required; cutter mounting; milling of a variety of shapes; uses of the milling machine for a number of extra jobs in tool rooms and inspection; and use of the milling machine for production work, including estimating; are among the subjects for other chapters. Indicating the thoroughness with which the varying facts of milling are treated, this volume consists of 896 pages, has 200 formulas and uses over 700 illustrations and charts Copies of the book, priced at $8.00 postpaid, may be obtained by writing to the Technical and Service Publications Department, Cincinnati Milling Machine Co., Cincinnati 9.

Jet-Pierce Mining Explained

Information on the fundamentals and practice of the jet-piercing process in mining and quarrying is available in a booklet, "Jet-Piercing, Key to Taconite Development," published by Linde Air Products Co. Jet-piercing employs a supersonic high-temperature flame.

Booklet on the process deals with the design and operation of automatic jet - piercing machines and hand-operated jet - piercing blowpipes. Piercing results are given and new developments toward increasing overall process efficiency are discussed. Copies of the publication may be obtained from Linde Air Products Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17.

Stainless Brazed Without Fluxing

Difficulties of furnace brazing stainless steel parts are largely overcome by first plating the parts with a thin coating of iron

By F. W. BEALL
Armco Steel Corp.
Middletown, O.

STAINLESS steel is considered a difficult material to furnace-braze, particularly on large articles where the removal of fluxing compounds presents difficulties. The scale which readily forms on this type of alloy prevents wetting by brazing alloys.

Stainless is subject to heavy oxidation when heated in reducing atmospheres containing any appreciable water vapor or carbon dioxide. Therefore, furnace brazing stainless steel without fluxing is confined largely to small articles that are protected from oxidation by relatively pure hydrogen containing very small quantities of water (−40 to −60°C dew point). By first plating a thin coating of iron on the stainless, many of these difficulties have been overcome.

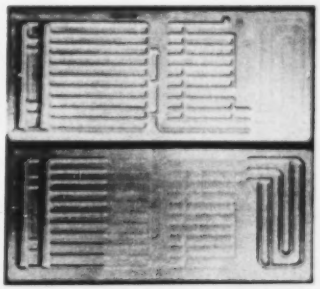
Replaces Brass Part — Solution to the problem of furnace-brazing 18-8 grade stainless without the use of a flux was worked out in Armco's research laboratories. Main reason for undertaking the investigation was the desire to use a brazed stainless steel assembly to replace a brass part without materially changing furnace equipment or brazing technique.

Principal obstacle was the use of a DX protective gas atmosphere composed of combusted natural gas and air in a ratio of three parts air to one part natural gas. A typical gas analysis shows: 30 per cent H_2, 20 CO, 1 CO_2, 49 N_2. Dew point varied between 80 and 120°F. This atmosphere is satisfactory for brazing either brass or steel but not for stainless steels.

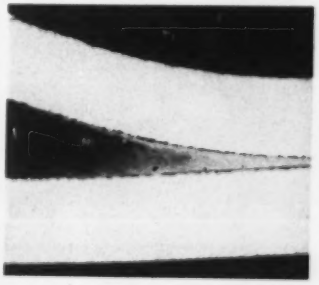
Experiments revealed that iron plating stainless caused the stainless to perform very much like iron and steel during a furnace brazing operation. Best results were obtained by using an iron plate thickness of 0.2 to 0.3 mils on type 302 18-8 stainless while copper brazing at 2150°F. By iron-plating the stainless, oxidation was prevented and the brazing alloy was permitted to wet the surfaces to be joined. Although the laboratory work concentrated on iron coatings, nickel and cobalt plated coatings would be expected to be comparable in behavior to the cheaper iron plate.

Activation Treatment—An activation treatment is necessary to iron-plate stainless successfully. The process consists of anodizing the article to be plated for a few minutes in a solution containing 30 per cent H_2SO_4, 10 Na_2SO_4, and 0.05 NaCl (by weight) followed by a short cathodizing cycle. For sufficiently rough material such as No. 1 finish, the anodizing cycle usually can be omitted. After the activating treatment and a cold water rinse, the parts should be transferred as rapidly as possible to the iron plating tank.

Composition of the iron plating bath used was: 40 oz. per gallon $FeCl_2 \cdot 4H_2O$ and 45 oz. per gallon $CaCl_2$.

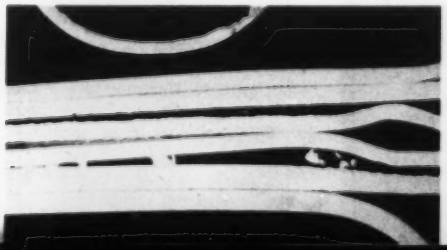


Above—Outside shapes of two halves of refrigerator evaporator. Pieces are blanked and drawn to this contour. After cleaning and activating, the pieces are iron plated, then nested together with a thin sheet of copper separating them and fastened by folding the flange of one piece over the other piece. Brazing is done at 2150°F using a 1½-minute cycle in a batch type electric furnace. Reducing pressure inside the pieces by an evacuating system provided contact for brazing. A pickling treatment cleans up the evaporator

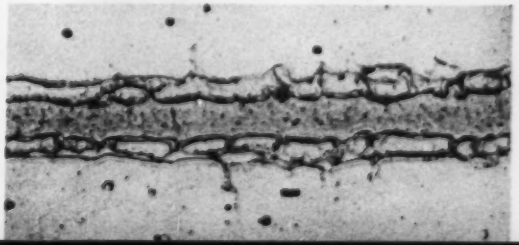


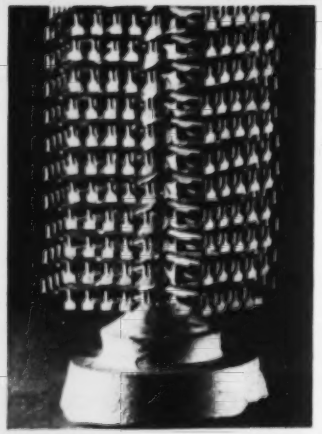
Large fillet obtained while copper brazing iron-plated stainless. Note surface alloying of copper with the steel. Actually, during tests designed to rupture joints, failures almost always occurred through the mid-thickness of the copper. 55X

Typical joints and fillets obtained when iron-plated stainless is copper-brazed. Ten per cent oxalic acid electrolytic etch. 8X



Copper brazed iron plated stainless steel joint at 1000X magnification. Wide area seen on each side of center line is the stainless. Next thin layer is iron. Separating this thin layer from copper in the center is a layer of iron and iron copper





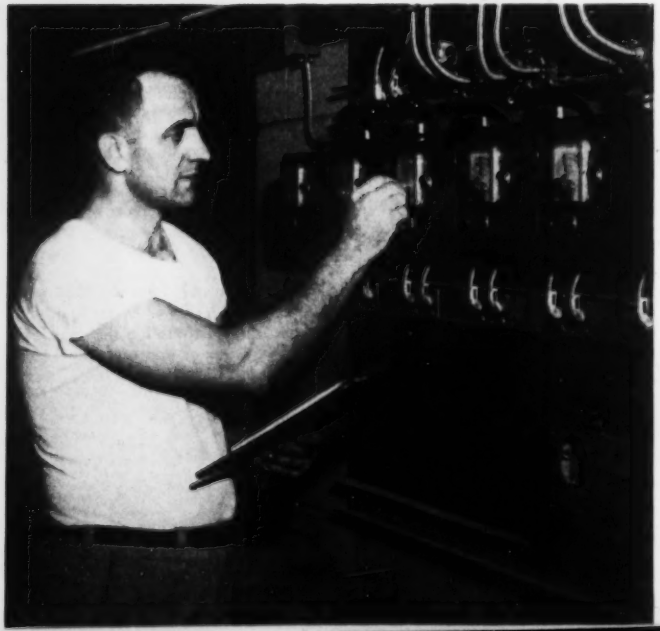
INVESTMENT

By R. R. MILLER
President
Precision Metalsmiths Inc.
Cleveland

Above—Casting tree of 275 electrical contacts shows mass production possibilities of investment casting. Contacts located in rows around outside of the tree are cut off and sand-cleaned before shipping

Left — Operators mass-produce expendable wax and plastic pattern by injection molding. Individual patterns are soldered to pattern trees for insertion in flasks and covering

Below—Bank of Simplytrol controlling pyrometers in the nonferrous casting department control burn-out furnaces. As temperature recording needle contacts upper limit control, fuel supply is shut off. Automatic interrupters reopen circuits



WHEN defense industries clamor for increased production of small parts, many suppliers turn to investment casting to get them. The process can turn castings out, if necessary, in hundred thousand lots.

Parts are kept to close tolerances, have smooth finish, require little or no machining. Precision Metalsmiths turned out 750,000 such castings of one part for a single manufacturer.

Investment casting of a large quantity of precision parts, with no variation in their structure, and with greatest economy, depends on three factors: Mass production of close-tolerance, expendable wax patterns; properly compounded investment material that will withstand high temperatures and result in smooth-surface castings; close control over temperatures in burn-out furnaces.

At Precision, machined steel dies produce wax or plastic patterns for long runs. For shorter runs, a machined model of the part serves as master pattern for making pattern molds of sprayed or pressed metal. Injection molding machines mass produce expendable patterns of wax or plastic.

Patterns are attached to "trees" and placed in heat-resistant stainless steel flasks. Plaster-like investment covers the pattern to form the mold. After the investment hardens, flasks go to the burn-out furnaces.

Wax Patterns Burned Out—The control of furnace temperature is vitally important to successful investment casting. Furnaces have a temperature of 200 to 300°F when loading begins. Automatic temperature controls then are set for 1250 to 1300°F for the 9-hour melt and burn out cycle. In the first 5 hours required to bring the oven to maximum temperature, the wax pattern in the flasks melts, and most of the moisture leaves the mold investment. Last 4 hours of the cycle occur at maximum

CASTING.. *Money-Saving Mass Producer*

temperature and accomplish two purposes: Burning out of the carbon created by the burning wax and breaking down of the chemical composition of the investment to achieve the correct porosity.

Before nonferrous metal pouring, oven temperatures drop so flask and investment can cool to pouring temperature which varies between 600 and 800°F depending on the part and alloy and whether vacuum or centrifugal casting is to be used.

Tight Control—Hair-trigger temperature controls is a must in the process. If instruments were to read 800° and furnaces were to drop to 600°, a miss-pour occurs because the molten metal chills and will not fill all the pattern cavities. Each furnace takes 72 small flasks or 24 large ones. Hence, a miss-pour is costly. On the other hand, overheating of the flask causes gaseous conditions to develop as the molten metal reacts with carbon in the investment. Result is metal porosity or castings with a rough surface.

Simplytrol controlling pyrometers of the direct contact type, connected by thermocouples to each of 26 oven-type gas fired furnaces assure consistent temperature control. Pyrometers are located along one wall where their large direct-registering dials can be easily read. Controlled temperature also corrects carboning-up of the surface of nonferrous parts which occurs if furnace temperature fluctuates and carbon is not completely burned out.

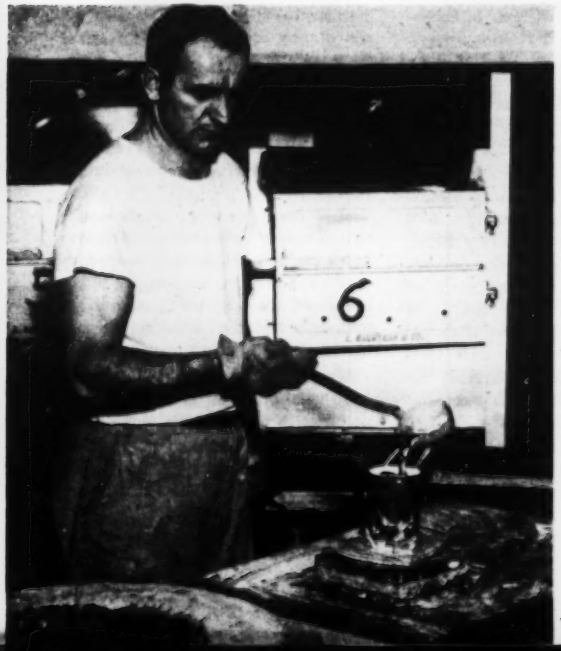
After castings cool, investment is removed. Castings are then cut from the "tree" and sand cleaned for shipment.

Ferrous Control Differs — For ferrous casting, the investment material has a slightly different composition. Time and temperature cycle is modified accordingly. Simplytrol programming pyrometers rigidly control temperature schedule, raising heat slowly and keeping required changes even throughout the cycle.

Furnace temperatures start at 250° and are held there for 12 hours, then temperature rises gradually to 1800° where it is held for another 12 hours. It is gradually dropped for pouring which ranges from 1000 to 1700°F.

Programming pyrometers not only assure required accuracy, but eliminate need for individual supervision, and frequent references to oven temperature during the melt-burn-out cycle. Programmers also control the time for each heat interval of the furnace. Specially cut timing cam attached to the programmer's electric timing mechanism controls this complex heat cycle automatically. An arm and lever connected to the temperature setting indicator rides on the timing cam. As cam revolves, the lever adjusts temperature.

Pouring aluminum into prepared flask in the nonferrous department. Vacuum is applied to the porous investment at the bottom of the flask to draw the molten metal into extremities of the mold



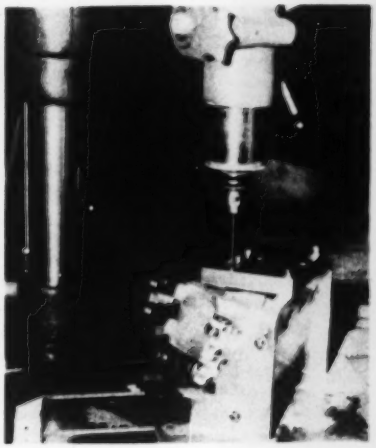
Vacuum jars agitate flasks under vacuum to evacuate air bubble formed in the plaster-like investment during mixing

DISINTEGRATION

Becomes Production Necessity

This thoroughly proved production and salvage tool pays for itself in short order. Expanding applications are bringing about a boom in sales

By GENE BURCH
Director of Research and Development
Warner Division, Clinton Machine Co.
Detroit



Closeup of equipment removing broken tap from aluminum casting in Clinton Machine Co.'s shop. Operation is similar to work being done in salvaging expensive parts in a growing number of machine shops

METAL DISINTEGRATION is not new, for similar methods were patented as early as 1878. There is nothing mystic or fantastic about it but recognition of its value is just dawning on industry. The process is not only a new method of machining but a modern production necessity.

Clinton Machine Co. is a pioneer in the real boom in the disintegration field. The trade name Thomas Metalmaster, for the company president, became the original equipment in the field. The first machine was hand made from parts available.

Crude but Effective — Case for the cutting head was made from an old tail light can of an ancient vintage Dodge motor car. The unit sold for $500 and the first job it did was the salvaging of an $18,000 crankshaft, saving it from going to the junk pile. Despite increasing equipment costs, the modern disintegrator often pays for itself in one operation or one job.

It is possible that the modern conception of metal disintegration was conceived because of the process of metal etching. Small units on the market, designed for etching metals, caused some smart operators to conclude that metal displacement took place with the etching process and the metal etching pencil became the forerunner of disintegration equipment.

Tap extracting requirements were an important cause of the advancement in disintegration. It is still a major selling feature of the equipment, since it is not uncommon for a tap to break on the last hole that is drilled or tapped in an expensive casting.

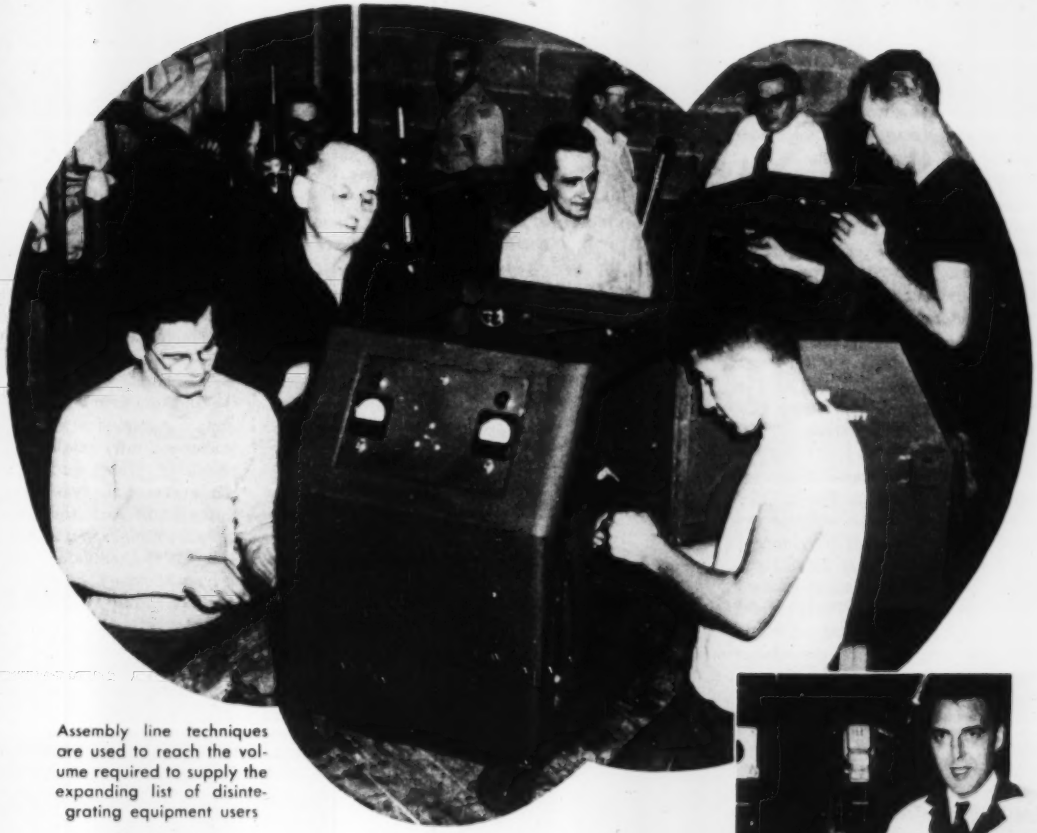
Theory of metal disintegration becomes more and more factual. It is known that the arc formed in striking the work and lifting causes a chemical and physical change in the metal. Electrical current flowing through the electrode and work causes an instantaneous heating and melting of the metal directly below the electrode and the flow of coolant causes an instantaneous cooling of the molten metal. The metal is shocked thermally, causing the metallic bond to break and the particles of metal to loosen from their bond. They are then washed away with the coolant. From 0.002 to 0.004-inch of material is disintegrated from the work with each vibration of the electrode, depending on the hardness of the material and the electrical energy used.

Rapid-Fire Cutting — A feature of the Metalmaster equipment is the speed with which hard metals can be cut. Stellites, carbides, tool steels, which normally are difficult to drill, cut or shape, are not cut like hot butter, but the ratio of cutting speed of these metals is from 10:1 to 50:1 faster than old methods. One-quarter inch Carboloy is drilled in 5 minutes; $\frac{3}{8}$-inch thick Stellites, 60 seconds; and $\frac{3}{8}$-inch broken taps $\frac{5}{8}$-inch long are removed in less than 3 minutes.

Ability of disintegration equipment to drill or cut hardened metal, has resulted in the salvaging of literally millions of dollars worth of parts that would have been junked if they could not be repaired or corrected with disintegration equipment. Key slots are cut in hardened gears. Dowel pins can be removed and relocated in hardened dies. The complete application of disintegration equipment to the metalworking industry staggers the imagination.

Plain or Fancy—Electrodes used in disintegration may be made in almost any shape or size. It has been mentioned before that coolant runs through the center of the electrode. Round electrodes from 0.010-inch to 2 inches or more, pierce the metal with varying speeds and current requirements. Electrodes with splines gear-shaped can disintegrate through the hardest materials. Square holes can be cut as easily as round ones and electrodes shaped like letters of the alphabet, as well as numerals, imbed themselves in material of any hardness.

Marking of hard metals, which has been problem in industry, is now easily and speedily done. The process roller that forms steel sheets or steel bars are hardened so that imbedding letters into the hardened roller is difficult. With metal disintegration the electrode



Assembly line techniques are used to reach the volume required to supply the expanding list of disintegrating equipment users

is formed to the shape of the letters or numerals desired and the disintegration process actually etches the letter deep in the surface of the roller, effecting an easy marking process for the rolling mill to apply their trade mark or identifying part number on the metal parts being rolled.

Diemaker Too—It is conceivable that an entire die may be roughed out and in the near future a die may be formed by shaping an electrode properly for the die cutting dimensions. The users of disintegration equipment have taken the disintegrator from a place of salvaging only into die forming. The die for the forming of the pattern of a popular double-edged razor blade was cut with disintegration equipment.

Entire die production wasn't done in this manner but the rough cutting of the die resulted in a great time saving for the die makers. Disintegration cuts more rapidly than diamond tools or other methods developed for cutting such material. Depending on speed of cuts, sintered carbides can be cut to accuracies below 0.002-inch and at certain speeds 0.0005-inch.

Copper was the first electrode used and is still used by some makers of equipment. Cost was a factor in its use but other metals, many times more expensive, were found to be more economical than copper and also more precise. Copper has a tendency to bell at the bottom, affecting the accuracy of the work.

Works Better—After much research, Thomas Metalmaster placed on the market an electrode made from an alloy of precious metals trade named "Thomlium." Not only does this material give greater precision, but the relative erosion rate of electrodes, compared

Original Metalmaster disintegrator made from parts available saved many times its cost the first time it was used

with copper, is as high as 50:1. Costs are also favorable where set-up time is considered. High melting point and stability of the metal at high temperatures seem to be controlling factors for electrode material in disintegration.

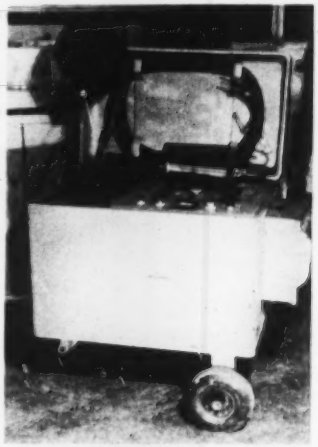
Welding equipment has the reverse action of disintegration, depositing metal and adding to metal mass instead of removing metal molecules. One of the prime difficulties encountered in disintegration equipment designed, is the fact that periodically, the electrode material may weld to the work. With tool steels there is a greater tendency to weld than there is in sintered carbide materials or Stellite.

Right Touch Helps—It is possible that the reason for the electrode welding to the work is that the electrode comes into contact with solid, rather than fused metal, much as the action takes place in resistance welding. There is definite skill created in the continued use and operation of the disintegration equipment. A touch is developed very similar to the touch that an operator experiences when he learns electric arc welding.

It is for this reason that automatic feed disintegration equipment has not always been successful and competitive automatic equipment makers were usually forced to be content with much slower cutting speeds because they must use lower electrical currents to prevent electrode sticking. Metalmaster automatic equipment was unveiled for the first time to Army and Navy personnel in mid-December and placed on the market the first of the year. Designed as an accessory, the automatic equipment can be installed on the older types. Feed is hydraulic, electrically controlled from electrical signals so that sticking is impossible, eliminating the biggest bugaboo in the disintegrator equipment.

Reason for the ease with which Stellite and cemented carbides are cut, is the fact that the bond of the molecules and particles are weaker and they are in a more highly stressed condition than normal steel. The Stellites and carbide molecules are more easily broken up by the melting and the thermal shock. In steel the bond is stronger and it is harder to melt and it is also more difficult to effect the chemical change resulting from the thermal shock.

Broken drills may be removed from any type of metal quickly without distorting the nature of the material and without affecting the temper or the molecular structure. Skilled operators often find that it is only necessary to drill down to point where the drill binds in the work, causing the drill to fall out when the point of stress is removed.



Portable shop model designed to work in conjunction with a drill press. Although small it has all the features of deluxe models and cutting speeds to equal the largest types

Actual process for the removal of a tap with disintegration equipment requires the centering of the work under the electrode so that the electrode will pierce the center of the tap and not strike the work. Correct selection of the outside diameter of the electrode is important for easy removal. Disintegrating equipment removes the entire core of the tap, causing the tap to collapse and fall out in sections. Thread in the workpiece is not affected and temper is unchanged. All that is required is the chasing of the threads and workpiece is as good as new.

Because there are no text books and little written information on metal disintegration, the equipment user is dependent on the field representative for technical information and service. In addition the company is now publishing the Thomas Metalmaster Technical Bulletin for its customers. This service, believed to be the first in its field, is intended to supplement but obviously not to replace the field staff. The field representatives know a lot of tricks of the trade that enable customers to get more work out of their existing equipment.

In thinking about the future of metal disintegration it is easy to get lost in the clouds unless one problem is considered at a time. Magnesium, for example, poses problems in drilling or grinding. The metal burns and explodes at certain temperatures and small particles, particularly dust and drill chips burn at feverish temperatures. Disintegration with the coolant flowing directly through the electrode controls the temperature that would ignite magnesium and make it safe to handle.

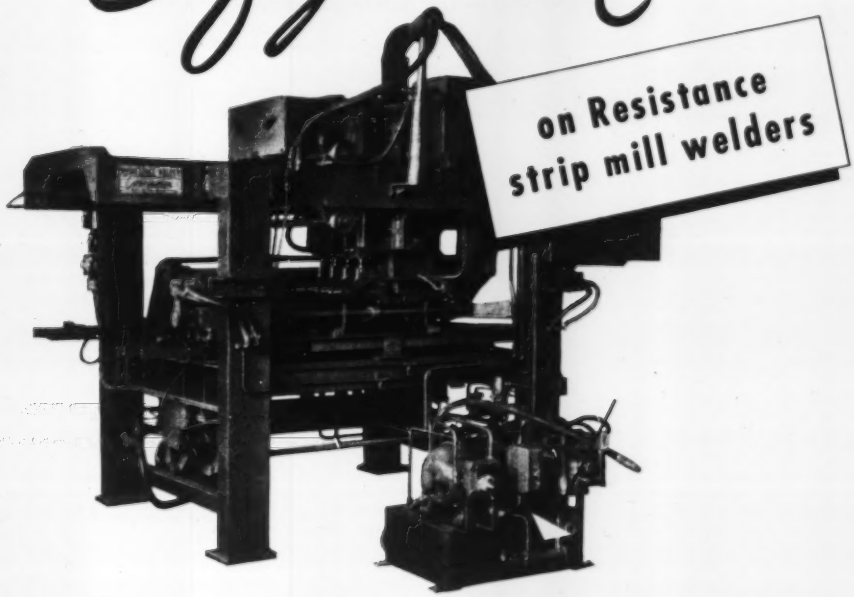
New equipment reflects the thinking of both the manufacturer and the customer in providing a machine with additional safety and performance features built in. The electrical system, for example, is assembled as a unit and can be removed from the cabinet by loosening four screws and removing the section on a track. A firewall separates the electrical system from the coolant system. Coolant moisture and vapors can not deteriorate electrical parts.

The best prospect for a new disintegrating machine is a large company who has one in its shop. A company doesn't have to be large to afford this equipment as models are available in a wide range of sizes. The smaller equipment is used in conjunction with drill presses and has the features of the deluxe line.

Based on the number of disentegrators now being used in American industries, savings already run into millions of dollars. A recent report from a large aircraft company tells of a reduction in salvage costs per man to $8 from the former cost of $35. A large cash register manufacturer says each of two disintegrators saves $35,000 per year in die salvaging alone. This total does not include the salvaging of parts because of broken taps drills or studs.

how hydraulic fluid temperatures are

Safeguarded



Producing four rows of seam-welds simultaneously on the lapped joint of 58" strip mill stock (up to .092" thickness), this Resistance Welder depends on hydraulic power to operate welding heads and traverse.

Naturally the manufacturer, Resistance Welder Corp. of Bay City, Michigan, must take every precaution to maintain a smooth, unified flow of material through the machine. *And it does!* Attached to the power unit is a Ross Type BCF Exchanger to assure full pump capacity by holding the hydraulic fluid temperature within most effective limits.

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Portable Bar Centering Tool Speeds Handling

FASTER—more efficient bar centering results from a suggestion by F. E. Riley, British tool engineer, who brings the mountain to Mohammet with a portable centering tool easily constructed from standard material.

Equipment required to make the centering setup consists of a standard portable electric drill and a 6-inch, 3-jaw scroll chuck. Drill should have a parallel portion of usable length on the bearing housing at the rear of its chuck. This portion is machined concentrically with the drill chuck axis. To this part of the drill is attached a steel sleeve whose projecting end stops short so that the chuck key can be operated without hindrance. This is the only addition to the portable drill required.

In order to center a bar, it is necessary to have a guide bushing for the sleeve on the drill. Guide must be attachable to a range of bar diameters. A standard three-jaw scroll chuck having a body diameter of 6 inches fills these requirements. Its gripping jaws will accommodate bars up to 4-inch diameter. Jaws grip on the outside diameter of the bar for a length of about $1\frac{1}{4}$ inches so the chuck center line is in line with that of the bar within 0.002 or 0.003-inch.

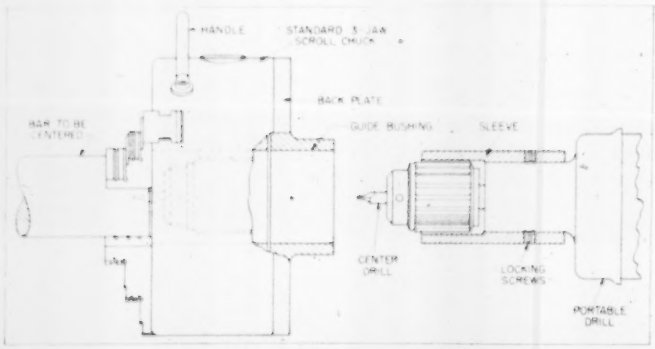
Guide Bushing Attached—Guide bushing for the sleeve on the drill is a close sliding fit in the bore of a back plate attached to the chuck. Back plate bore and the register for fitting to the chuck recess are bored at the same setting to ensure concentricity. After back plate is secured to the chuck, the central bore of chuck body is machined out concentrically to the same diameter as bore in the back plate. Bore of the chuck and bore of the back plate then form one continuous guide bush for guiding sleeve attached to the portable drill.

Chuck Easily Handled—So the scroll chuck can be handled easily, a common piece of builder's hardware, a door handle, is fitted to the chuck body by means of two screws. In operation the scroll chuck is lifted by its handle and its jaws tightened on bar end by means of the chuck key. The portable drill with a center drill mounted in its chuck is inserted into the bore of the scroll chuck's back plate.

Bar end need not be cut square to obtain a satisfactory center since the guide bushing is located in relation to the outside diameter of the bar. Condition of the bar end is of no importance.

Used At Bar Saw — Centering tool can be used successfully at the bar saw resulting in considerable economy and convenience. While the power hack saw is cutting through the bar, operator drills the center hole in the bar end projecting from the machine vise. Bars centered at the sawing operation are transported direct to the lathe, eliminating a journey to the centering machine.

Centering also can be performed on bars stacked in the bar rack. It is only necessary to pull forward a bar so that it projects from the rack sufficiently to allow attaching scroll chuck jaws.



Tooling setup for portable bar centering tool

Butyl Insulates Transformers

Butyl insulation, in use for two years on indoor instrument transformers, is finding successful application on outdoor models according to a technical paper by General Electric engineers at Lynn, Mass. Molded butyl insulation provides design engineers with a new dry type material having many advantages for transformer casings: Resistance to water penetration, resistance to weathering, water-tight adhesion to metals and resistance to surface voltage creepage. High accuracy transformers can now boast of high thermal rating, small convenient size and long-time stability of insulation properties.

Before introduction of butyl, transformer manufacturers used a dry type or compound impregnated construction up to 15,000 volts and liquid filled designs above 15,000. Out of door service required placing the insulated transformer in a waterproof metal casing with porcelain bushings.

Plastic For Molds Explained

Recent developments in the Croning process of producing foundry molds and cores are discussed in "Bakelite Phenolic Resins for Foundry Molds and Cores," a new booklet offered by Bakelite Co., a division of Union Carbide & Carbon Corp. Booklet presents fundamentals of the process and outlines variations in technique developed since first demonstration of the process last year in Cleveland. It includes information on the part that sand, pick-up agent and parting agent play.

Also detailed are advantages of the process to the users of castings, who get better quality castings which can be finished at lower cost; and to foundries, which gain improved working conditions, lower cost molds, and increased overall efficiency. Copies of the booklet may be obtained by writing the company, 300 Madison Ave., New York 17.

It's true! Acetogen offers a better, cheaper, faster and complete STEEL FABRICATION SERVICE

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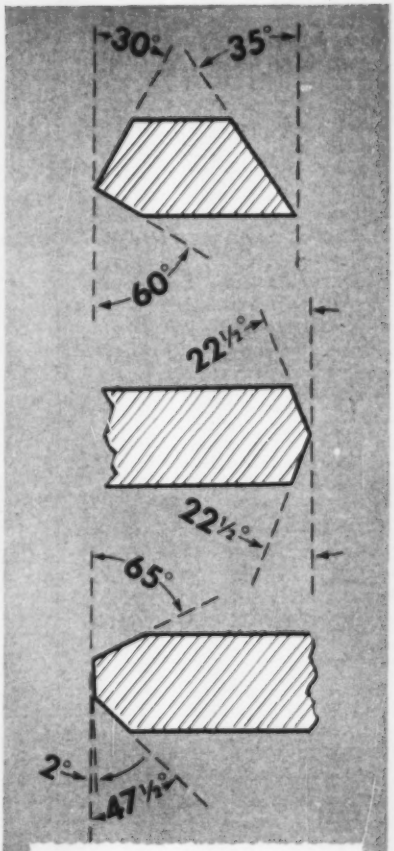
Our organization has full security clearance to contract for defense work through the Department of the Army, Philadelphia Ordnance Division. Send us drawings, sketches, or blueprints for any fabricated work that you have, including the most difficult. We will promptly quote price- and time-schedules that will amaze you. Get those drawings *now* and write today! Acetogen Fabricators, Inc., Room 822 Commercial Trust Bldg., Philadelphia 2, Pa.



What do you think of these bevels? They are all found on one piece of armor plate that we are now fabricating in quantity. Other fabricators would have to *grind* these edges to required tolerances. Our *flame-cutting* achieves the same exact tolerances—and we pass the savings in time and money on to the customer!

ACETOGEN FABRICATORS, INC.

Originators of precision flame-cutting

BORON STEELS

Supplement Scarce Nickel, Moly Alloys

By DONALD H. RUHNKE
Chief Metallurgist, Central District
Republic Steel Corp
Massillon, O

BORON is playing a vital part in filling the gap left by the demand for nickel and molybdenum in defense requirements. Chromium must be included in this group but the shortage is not so critical, at least in some grades of ferrochromium. Supply of manganese is also of major concern. If ocean transportation were to be disrupted, the latter two elements would be in much shorter supply.

While the element boron, when added to steel, acts in some respects like the alloys it is replacing, there are some fundamental differences. Boron has an atomic

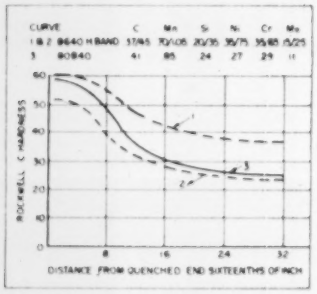


Fig. 1—Typical heat of 80B-40 plotted on 8640-H band for comparison. This boron steel is now in use as an alternate for 8640

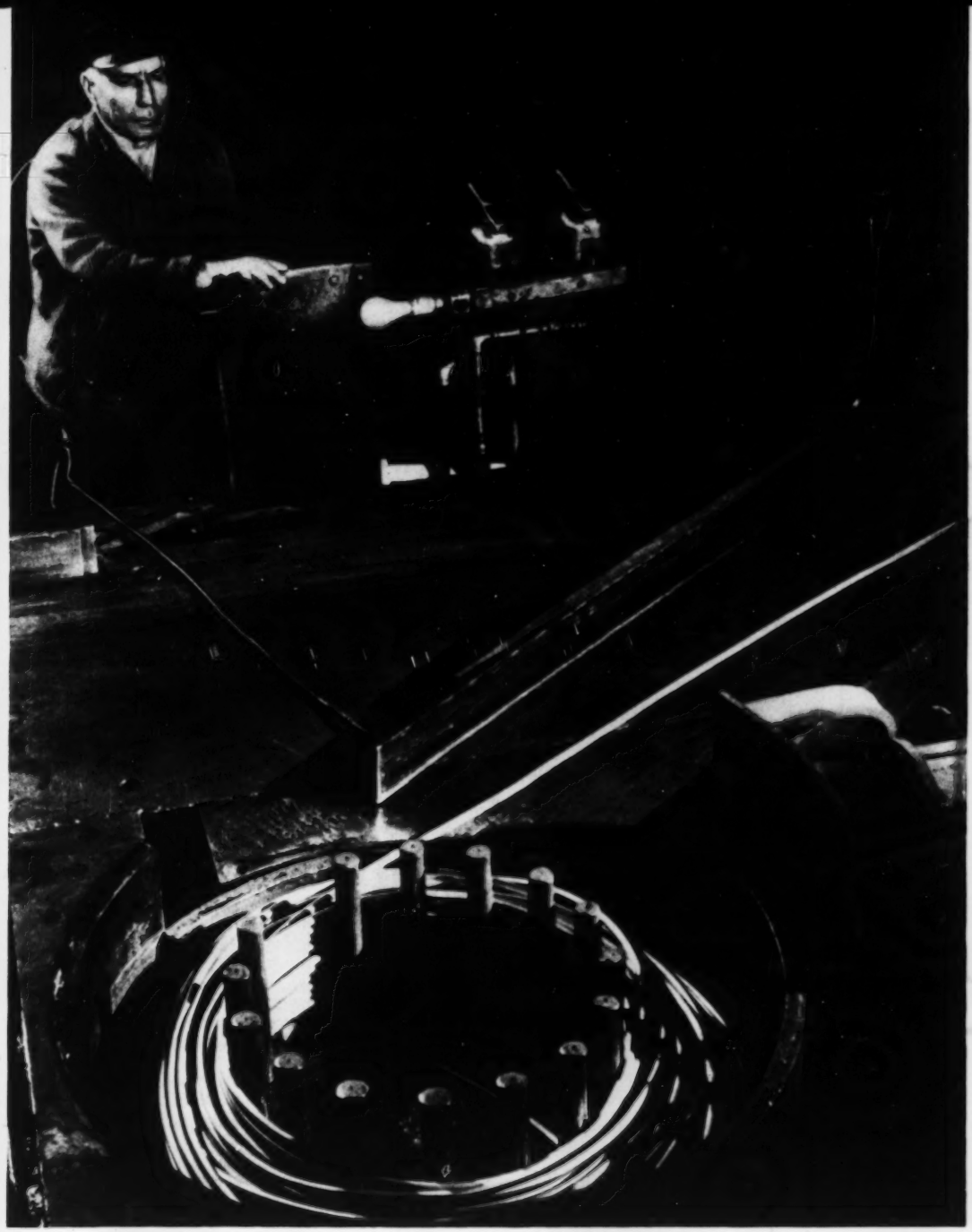
radius close to that of carbon and nitrogen and much smaller than iron and nickel and some of the more commonly used alloys. It has a high rate of diffusion, through iron in the solid state, as expected from the small atomic radius and apparently moves interstitially as compared to substitutional mechanism of nickel and others.

Since in open hearth steel we add only 0.02-pound of the element boron, per ton of steel, the atomic population of boron through the crystal structure is low. This, along with the high diffusion rate, points to possibly a grain boundary effect to account for the very potent action of boron in steel. Transformation characteristics also indicate boron may be concentrated at grain boundaries.

Table I lists many of the agents now used in production and a few experimental alloys. All of these

PRESENT STATUS OF BORON ALLOY STEELS

1. There will be sufficient boron agents to meet the projected requirement, although not an ample supply of those agents found most satisfactory.
2. The December melt schedule carried 44,000 tons of boron alloy steel—about 9 per cent of the alloy steel production including open hearth and electric.
3. Boron alloy steels in 0.30 carbon grades and over are now widely used for bolts, crankshaft, axle shafts and rear axle assemblies, automobile front end parts such as spindles, springs (coil and flat) and a variety of other constructional parts, with very little, if any, processing difficulties. Specified mechanical properties are being met. If the hardenability pattern of boron alloy steels is recognized and allowed for, there should be no serious trouble.
4. Carburizing grades are being used in considerable quantities. Over 300 heats of 94B17 having been produced and most of this tonnage processed and in the field. Possibility of increased distortion must be allowed for; need for higher reheating temperatures to obtain maximum core properties along with lower case hardenability cannot be overlooked. Direct quench after carburizing will generally be more satisfactory as far as case hardenability is concerned. Lower carbon in the core or base material is recommended. This may require change in annealing practice to avoid too low hardness which can affect machinability.
5. Reported loss of boron effect during heating for forging has not been established—in fact—we have found no evidence of this.
6. Boron does not increase corrosion resistance nor improve properties at low or elevated temperatures, such as Ni, Cr, Mo & V.
7. Tempering temperatures to obtain a given tensile strength level will be lower with boron alloy steels.
8. Boron alloy steels are being welded and we know of no case where boron has adversely affected weldability.
9. In view of the continuing alloy shortage, it is recommended that boron alloy steels be used to the fullest extent wherever possible, thereby allowing critical alloys to be available for those applications where boron will not fill the gap, such as certain defense requirements, heavy duty gears, large bearings, large sections used either as quenched and tempered or normalized and tempered, high temperature bolting or parts for very low temperature service. Do not overlook some of the old and new standard alloy steels without boron as a possible alternate for the higher Ni and Mo steels you may have been using. The 8100 series (low Ni-Cr-Mo) has applications for some parts where 8600 was formerly used. We see no need for the addition of boron where something else available will do the job. The 8100 series allows the steel producer to use alloys available in mill and purchased scrap to the best advantage. Where boron is required to provide the additional hardenability we have had the most uniform results when adding it to a Ni-Cr-Mo base.



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are used successfully although varying amount in pounds per ton are required along with some changes in steelmaking practice. A few have been found unsatisfactory for carburizing grades.

Necessary Protection — Marked affinity of boron for nitrogen makes necessary the presence of one or more of the protective elements. In periods other than the present defense effort or allout war effort, there might be advantages to having several grades of boron agents on the market. Present expansion in the production of boron alloy steels and the much greater projected expansion can result in a shortage of some of the more complex agents; not from the standpoint of a shortage of raw material, (borax) but of manufacturing facilities. The alloy steel industry considers it prudent to develop two or possibly three boron agents that would fit into the production facilities of all or most of the ferroalloy producers and yield results satisfactory to steel producer and user. This work is under way and shows promise.

With the brief background on some of the work being done to insure an adequate supply of boron agents in case the demand for boron alloy steels reaches the projected figure of 10,000,000 tons yearly, let us examine a few of the results to date of hardenability, mechanical properties and users' reaction to these steels. Fig. 1 shows a typical heat of 80B-40 plotted on the 8640-H band for comparison. This boron steel is now in use as an alternate for 8640.

All data presented were obtained on production open-hearth or electric furnace heats. No small induction or laboratory size heats are included.

Worth Studying — Hardenability pattern shown by this heat of 80-B-40 is representative of practical-

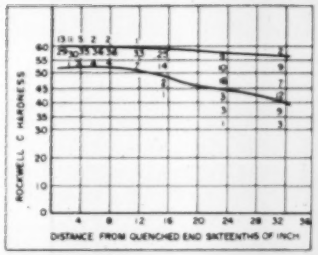


Fig. 2—4340-H band and results of 42 open hearth heats of TS-86B45, which is being substituted for many applications on which 4340 had been used

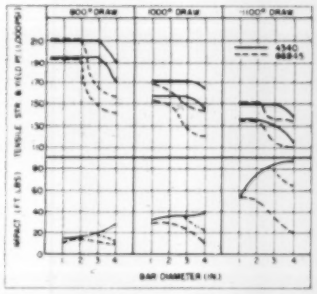


Fig. 3 — Mechanical properties of 86B45 vs 4340

ly all boron alloy steels and points to one of the precautions that must be taken in the selection of this product. Hardenability as measured by the end quenched test is near the top of the 8640-H band on the left hand side of the curve (representing hardness obtainable in light sections), drops to about the middle of the band at 8/16 and continues the downward trend to approximately the bottom of the 8640-H band at 16/16. It is important to recognize this characteristic. It simply means that this steel will fully harden to the same extent as 8640 in light sections but when applied to heavier sections there will be more variation in hardness at some distance below the surface and the average mid-radius or center hardness will be lower.

This is not necessarily a serious detriment to the successful application of boron alloy steels for a great many parts. The majority of structural parts are subjected to bending or torsional stresses in which the strength of outer fibers is of most concern. As long as the required strength is provided in these areas of maximum stress, field service should be satisfactory. Users of carbon and alloy steels have long recognized this and in many cases full hardening is not desired. In fact, the lower hardenability in heavier sections found in the boron alloy steels might be an advantage in some cases in minimizing distortion.

One further precaution should be mentioned, since the slope of the curve is steeper after passing the point of about 90 per cent martensite, these steels are more sensitive to the normal variation and even good heat treating practice. This means that if we are interested in practically full hardness at some point below the surface such as mid-radius and if we have established a reference point on end quench test that gives the required hardness when using a standard alloy steel, it is well to provide a little more safety factor when using boron alloy steel. It is suggested that the minimum required Rockwell C hardness be set 1/16 or 2/16 to the left.

Adequate Data—Several grades of boron alloy steel have been produced in sufficient quantity such as 14B35, 50B46, 81B40, 86B45 and 94B17, that we can begin to plot the spread in hardenability experienced with heats covering the specified analysis range. Fig. 2 shows the 4340-H band and the results of 42 open hearth heats of TS-86B45 which is being substituted for many applications where 4340 had been used. The figures refer to the number of heats reported having hardness readings at the various positions on the end quench test.

At the 1/16 position we find most of the heats near or over the top of the band. This is expected because the mean of the carbon

TABLE I
BORON AGENTS

	B	Si	Al	Ti	Zr	Mn	V	Ca
Grainal No. 1	0.2	3	10	15	..	..	25	..
Grainal No. 79	0.5	5	13	20	4	8	..	..
Silvaz	0.6	37	6	10	6	..	10	..
Silcaz	0.6	37	7	10	4	..	..	10
Spec. Grainal No. 79	1.0	3	13	20	4	4	..	..
Exp. B-V	1.7	37	10	..	..	..	5	..
Bortam	1.7	21	14	17	..	23	..	..
Borosil	3.0	42	..	..	..	..	..	..
Ferroboron	12.9	1	..	..	..	..	..	..
Ferroboron	17.5	1	..	..	..	..	..	..

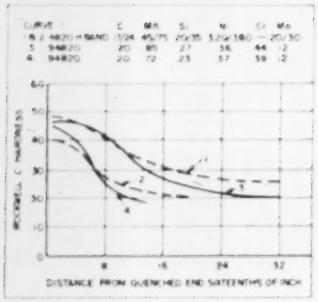


Fig. 4—Two heats of 94B20 compared with 4820-H band

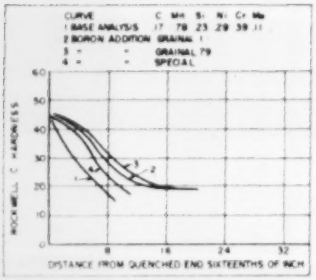


Fig. 5—Core hardenability, as measured by the end quench test, of the base analysis and three treated ingots

range is 0.45 for TS-86B45 as compared to 0.40 for 4340. Average hardenability for the 42 heats continues above the middle of the band out to 16/16 where 25 heats are within the range 55-60 RC, 14 heats within 50-55 RC and 3 heats below the band. The 16/16-inch point is considered to compare in cooling rate with the center of a $2^3/_4$-inch round.

Beyond this point the average hardenability of TS-86B45 falls under 4340 with seven heats below the band at 24/16 and 12 below at 32/16-inch. Tendency for lower hardenability in heavier sections is again noted although it holds up better than the 80BXX or 81BXX series because of higher alloy. The TS-86B45, even though having slightly lower hardenability is being successfully substituted for 4340 in sections up to 5-inch round, because as previously stated, full hardness is not required or desired for many applications.

Extra Checks Worthwhile — It was necessary to measure the possibilities of boron alloy steels by the end quench test because of the need for quick action in arriving at alternates for standard steels. This test gives much information relative to the mechanical properties in various sections and was successfully used to a large extent in the early days of NE steels during World War II. However, we still believe it necessary to do a certain amount of spot checking with the long established tensile test and a limited amount of impact testing.

This has been done on several boron alloy steels such as 80B30, 81B40 and 86B45. The 86B45 falls short by a greater degree to meet the properties of 4340 for which it is being used as an alternate in some applications than the 81B40 for 4140 or the 80B40 for 8640. Actually, the latter two boron alloy steels compare favorably with the two standard steels when due consideration is given to section size. Since it is wise to provide ourselves with information as to the limitations of a product as well as the good points, a comparison of 86B45 and 4340, treated in 1-2-3- and 4-inch rounds and tested at half radius is shown on Fig. 3.

Test Data Examined — Tensile strength, yield point and impact in foot-pounds are plotted for three tempering temperatures after oil quench from 1550°F. The solid lines for 4340, the dashed for 86B45. We find the boron alloy steel matching the 4340 up to 2 inches except for some difference in impact which is not considered significant. Some place between 2 and 3-inch round, probably about $2^1/_2$ inches, the response to quenching drops rapidly and this is clearly shown by the lower mechanical properties of half radius in 3 and 4-inch round. This does not mean that 86B45 cannot be used successfully in 3-inch round or larger because as previously mentioned the need for maximum properties for many parts is a relatively thin rim near the surface. We find increasing number of specifications today covering sections 4 inches and larger, where the test is taken just below the surface or at $^3/_4$ radius.

The drop in impact in the larger sections of the 86B45 points to the need for higher alloy content in underquenched sections if impact is to be maintained. Tests taken at $^3/_4$ radius in the 3 and 4-inch round, 86B45 gave higher impact values, reflecting the better quench at these locations (shown by dotted lines). Evaluation of impact data is difficult and probably has little significance except where ballistic properties are involved.

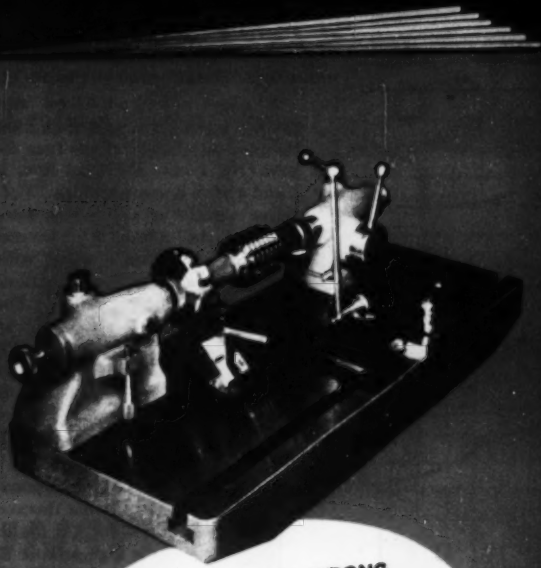
A slight increase in alloy content, when using boron steels in larger section, is effective.

Substitution Requirement — Any steel to be used as a substitute for standard alloy grades must include grades suitable for carburizing since a large percentage of alloy steel goes into carburized parts. Gears, bearings, rock-bit cutters and special parts requiring a hard wear resisting surface are a few typical examples. It is for these applications that considerable caution be exercised in the selection of boron steels and adequate testing be performed. We are not aware of any serious difficulties resulting from the use of 0.30 carbon or higher boron alloy steels but there have been reports of real problems with carburizing grades although large tonnages are now being used successfully.

Some of the difficulties experienced can be eliminated in the future by careful consideration of

TABLE II
MECHANICAL PROPERTIES 8740—8740 PLUS Ni—8740 PLUS BORON
Treated in 4" Round—Tests Half Radius
(Normalized at 1600° F in 4" Rd.)

Type	Yield Pt. (Psi)	Tensile Str. (Psi)	Red. Area (%)	Elong. in 2" (%)	Impact Str. (Ft. Lbs.)	Treatment
8740	127,500	147,500	53.3	16.5	21.2	Oil Quenched from 1550° F and 800° F Temper.
8740 + Ni	161,000	171,000	46.3	13.0	18.0	"
8740 + B	176,500	187,500	46.3	12.0	16.9	"
8740	107,000	129,500	56.0	19.0	46.8	Oil Quenched from 1550° F and 1000° F Temper.
8740 + Ni	110,000	131,500	59.8	20.0	53.4	"
8740 + B	130,000	146,500	53.3	17.0	49.1	"
8740	91,500	108,000	53.3	17.0	79.2	Oil Quenched from 1550° F and 1100° F Temper.
8740 + Ni	97,500	120,500	58.5	20.5	73.5	"
8740 + B	126,000	145,500	57.3	18.0	60.2	"



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more recent laboratory data, reports from users and field service data. First boron alloy steel to be used for carburized parts in any real volume was 94B20. In the selection of an analysis for carburized parts, both core and case properties must be considered. It has become general practice during recent years to measure potential core properties by the end quench test but some users, particularly design engineers like to see mechanical property values so we have prepared both.

Two heats of 94B20 were selected and compared with the 4820-H band as shown in Fig. 4. The 94BXX series is not recommended as a substitute for 48XX for all parts now made of the higher alloy grade but is being used some places and does have core hardenability close to the 48XX series. In Fig. 4 one heat of 94B20 follows the top of the band while the other is similar to a low side 4820 and drops below the band at 8/16-inch. While these two heats do not cover the full spread we have experienced over a large number of heats, they do represent high and low side.

Subject for Argument—Steel for carburized parts accounts for a large tonnage of alloy steel. The effectiveness of boron in the carburized case has probably produced more discussion and differences of opinion than any other characteristic of this alloying element. The work of several investigators pointed to a lessening of the hardenability effect of boron with increasing carbon content, reaching zero effect at carbon levels generally found in carburized cases. We believe this to be true in principle but this theory needs some qualifications.

Need for fast action in the introducing of boron alloy steels when the alloy shortage became critical about the middle of 1950, resulted in a wide divergence of reported test data on the early trials. In spite of this, many open-hearth heats of boron alloy steel for carburized parts have been used successfully and from these production results and additional laboratory work, a clearer picture is forming.

More Data—At the start, case

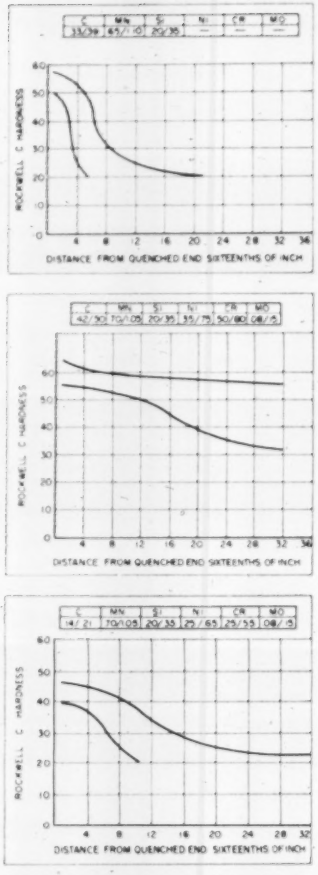
C Mn Si Ni Cr Mo
.13/.19 .65/.90 .20/.35 — — —
ROCKWELL C HARDNESS
DISTANCE FROM QUENCHED END SIXTEENTHS OF INCH
C Mn Si Ni Cr Mo
.42/.50 .70/1.05 .20/.35 .35/.75 .50/.80 .08/.15
ROCKWELL C HARDNESS
DISTANCE FROM QUENCHED END SIXTEENTHS OF INCH
C Mn Si Ni Cr Mo
.14/.21 .70/1.05 .20/.35 .25/.65 .25/.55 .08/.15
ROCKWELL C HARDNESS
DISTANCE FROM QUENCHED END SIXTEENTHS OF INCH

Fig. 6—Tentative hardenability bands for (top to bottom) 14B35H, TS 86B-54H, TS 94B17H

hardenability of the boron grades was compared with the standard steels. While this was of value it did not give us the true measure of the boron effect. More recently a base analysis, with and without boron has been checked. A heat of 8117 was selected and several ingots treated with different boron addition agents. Fig. 5 shows the core hardenability, as measured by the end quench test, of the base analysis and three of the treated ingots. Curve No. 3 is for Grainal No. 79, slightly above No. 2 for Grainal No. 1 and curve No. 4 for an experimental boron agent not quite as effective in the quantity used as Grainal No. 1 and 79. Note that the hardenability of the treated ingots is equal to 8620 and 4620, in fact, is within the 4817 band out to 10/16.

A series of standard and quenched tests was prepared from the product of each of the four ingots (No. 1 base 8117 and Nos. 2, 3 and 4 with boron additions). Sufficient number of test pieces were provided to allow for several quenching treatments along with extras for carbon determinations and rechecks if necessary. The tests were box carburized at 1700°F to approximately 0.050-inch case depth and either direct quenched from 1700°F, allowed to drop to 1550°F, and quenched or box cooled and reheated to 1550°F and quenched.

Tests used for carbon determinations were given the same thermal treatments as used for the hardness checks, plus a high temper to allow machining of chips. Hardness readings were first taken on the surface of the end-quenched bars, followed by successive readings at steps of 0.005-inch below the surface. When these data were examined, we were surprised to find a considerable increase in the distance to 60 Rockwell C, at carbon levels above 0.80 when direct quenched. Although this increase in hardness was found on the tests from the three treated ingots, with only slight differences, the possibility of error was not overlooked and several rechecks were made on this first series. All confirmed the original data.

Results Confirmed—As a further check, another complete set of end quench tests were prepared and these were gas carburized by Timken Roller Bearing Co. in furnace used for production parts. The only variation in thermal treatment between this series and the first was the necessity of direct quenching the entire end quench test from the gas carburizing furnace followed by reheating to 1700°F and treatments similar to the first series. Tests used for carbon determinations were given all thermal treatments plus tempering for machining. Hardness readings taken on this series confirmed results of first series in all respects.

As sufficient information becomes available, hardenability bands are being set up for boron

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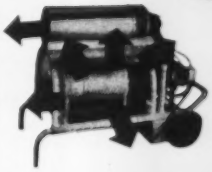

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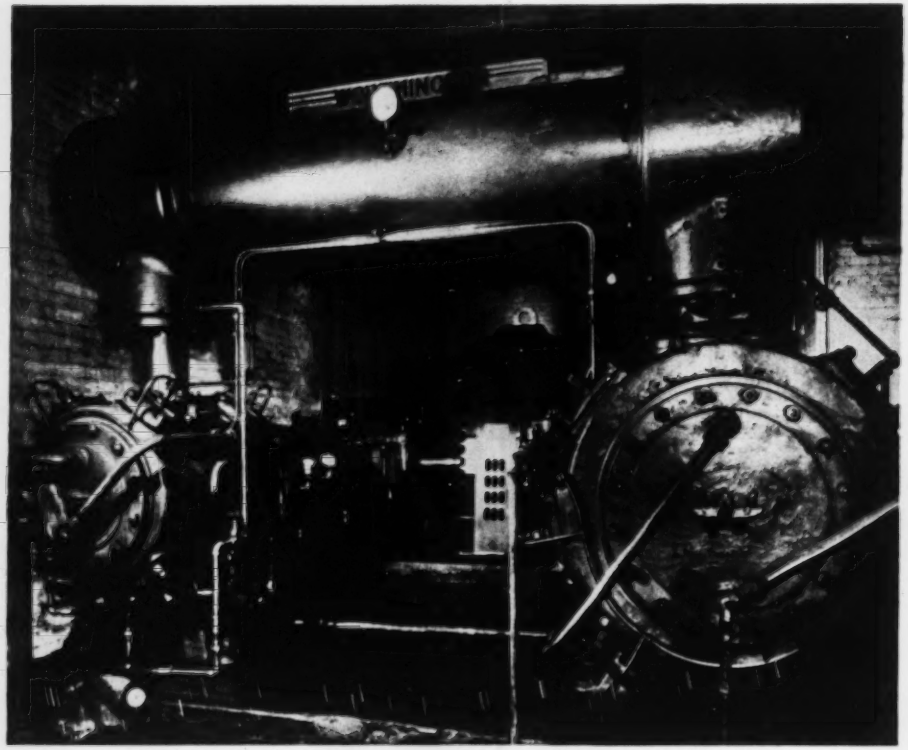

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alloy steels. Six bands, 14B35—14B50—50B45—81B40—86B45 and 94B17 will soon be published. These bands will be wider than the established bands for the standard alloy steels being replaced by the boron steels. The spread in hardenability resulting from a workable analysis range for the base grade must be recognized as in the past and to this must be added some additional spread to allow for variation in the effectivenes of the boron addition. In most cases, this increase in hardenability range will occur on the right hand side of the curve and should be a problem to users only when full hardness is required in heavy sections.

From data presented by the author before the Cleveland chapter, American Society for Metals, Jan. 7.

Urges Boron Substitution

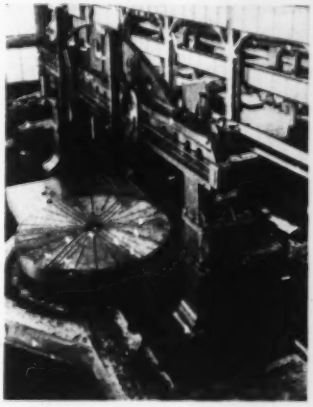
Many users of alloy steels will have to turn to boron-treated steels or do without, says Dr. Murray C. Udy, Battelle Memorial Institute, Columbus, O. Dr. Udy told the Electric Furnace Steel Conference, Pittsburgh, that the nonmetallic element boron can substitute for many hundred times its weight of the scarce alloying metals, manganese, nickel, chromium and molybdenum for improving the hardenability of steel.

Says Dr. Udy, "The shortage of conventional alloys used in steel makes wider use of boron not only imperative but unavoidable. U. S. steel production, at a current rate of more than 100 million tons annually, is greater than ever before in history. Ordnance requirements for alloy steels are increasing and have not yet reached their peak. Jet engines and gas turbines have created new demands for nickel, chromium, molybdenum and other materials used in high temperature alloys. An abundant supply of boron makes it possible, in the interest of national security, to conserve the conventional alloying materials for the most critical purposes.

"The addition of boron to steel is by no means a corrective for poor steelmaking practice," Dr. Udy points out. "Boron steels are more sensitive to poor steelmaking practice than most other alloy steels. It is one of the things which must be overcome to successfully adapt boron steels to ease the present emergency. When proper metallurgical techniques are used, boron can do the job of increasing steel hardenability without adversely affecting the physical properties or safe performance of the alloy. Boron steels are less sensitive to shatter cracks and flakes than some of the steels they replace."

Big Machining Jobs Cut to Size

Flexibility for handling large diameters and heavy tonnage is incorporated into a Sellers 42-foot vertical boring and turning mill built for General Electric Co., Schenectady, N. Y., by Consolidated Machine Tool Corp., Rochester, N. Y. Work is usually mounted on and rotated by the table, the tools being mounted in each of the crossrail heads with the crossrail on the block-type uprights. Even greater swing than



DIAMETERS UP TO 42-FEET HANDLED
. . . control possible from 3 locations

the normal 42-foot diameter can be provided when needed by moving crossrail and uprights to the rear.

If still larger parts must be machined, crossrail can be removed; workpiece fastened stationary on the bed and iron floor plates surrounding the machines; and work handled by mounting cutting tools on stands on the revolving table. Control of machine functions is by portable pushbuttons convenient to the operator. Control is possible from the floor or rail head platforms.

When the crossrail is removed and work is stationary on the bed or floor plate, a special portable pushbutton station plugs into the center of table providing the operator complete control from inside the workpiece while riding on the table. Speed indicators and horsepower meters are mounted on the machine so that operator can control his operation and take full advantage of the power available.

Huge hydro electric generator frames and allied parts will be machined on this Sellers mill. GE spent four months preparing its foundation prior to pouring, used about 1000 tons of concrete and steel in construction and provided a two-month curing period prior to shipment of the machine from the tool builder's plant.

Total weight of machine is 350 tons. It is powered by a 100-hp direct current motor, supplied by a 100 kw motor generator set, providing variable voltage control. Table speed is from ¼ to 10 rpm and feed range is 0.015 to 1.54 inches per revolution of table. Rate of rapid traverse is 72 inches per minute. Guaranteed accuracy to turn face and bore is within 0.001-inch in total distance. Table runs on circular tracks of Formica manufactured specially for this purpose. Tracks are flooded with oil so that surfaces are actually separated by a film of oil at all times. All lubricant is filtered.

Alkaline Process Derusts Metals

Development of an alkaline derusting process for steel, cast iron, malleable iron and other iron alloys is announced by Enthone Inc., 442 Elm St., New Haven, Conn. Process requires no acid. High carbon steels that are prone to be discolored even in inhibited acids can be rapidly derusted without any trace of tarnish or attack. Because of its alkaline nature, it automatically cleans and derusts. The solution can be used in a steel tank at room temperature.

Work to be derusted is made the cathode in a solution of Enthone derusting compound for a few seconds or several minutes depending on the condition of the surface. In one test, complete rust and scale removal was accomplished in two minutes.

Carriers roll off power conveyor in finishing oven to crosstrack switches for 90° transfer to shipping area.

Carriers descend through degreasing tank on power-operated chain conveyor

Solenoid operated switch automatically brings trolleys on parallel tracks into single track alignment.

A well-known metal partition manufacturer faced the problem of increasing production without enlarging building. New and better handling methods were obviously needed. They chose an American MonoRail overhead handling system as the best answer to increase capacity without increasing space and **with less handling labor.** Now, this American MonoRail system handles the steel components from receipt of raw materials, through finishing to shipping. The system boosted production, cut handling labor, improved space utilization, reduced material damage, bettered working conditions, and improved production control.

Let an American MonoRail engineer show you how it can be done in your plant.

THE AMERICAN MONORAIL COMPANY

13102 ATHENS AVENUE ● CLEVELAND 7, OHIO

CALENDAR
OF MEETINGS

January 14-17, American Management Association: General management conference, Biltmore Hotel, Los Angeles. Address: 330 W. 42nd St., New York.

January 14-17, Plant Maintenance Show: Convention Hall, Philadelphia. Manager: Clapp & Poliak Inc. Address: 341 Madison Ave., New York.

January 14-18, Society of Automotive Engineers: Annual meeting & engineering display, Hotel Book-Cadillac, Detroit. Society address: 29 W. 39th St., New York 18. Secretary: John A. C. Warner.

January 16-17, Steel Shipping Container Institute: Winter meeting, Pierre & Hampshire House, New York. Institute address: 600 Fifth Ave., New York 20. Secretary: L. B. Miller.

January 16-18, Southern Industrial Distributors Association: Mid-year meeting, Edgewater Gulf Hotel, Biloxi, Miss. Association address: 208 Peachtree Arcade, Atlanta 3. Secretary: E. L. Pugh.

January 17, American Coke & Coal Chemicals Institute: Western regional meeting, Congress Hotel, Chicago. Institute address: 711 14th St. NW, Washington. Executive secretary: Samuel Weiss.

January 18, Malleable Foundrys Society: Semi-annual meeting, Hotel Cleveland, Cleveland. Society address: 1800 Union Commerce Bldg., Cleveland. Secretary: Lowell D. Ryan.

January 18-19, American Medical Association, Council on Industrial Health: Annual meeting, William Penn Hotel, Pittsburgh. Association address: 535 N. Dearborn St., Chicago 10. Secretary: Dr. C. M. Patterson.

January 21-22, Industrial Furnace Manufacturers Association: Mid-winter meeting, Schenley Hotel, Pittsburgh. Association address: 420 Lexington Ave., New York 17. Secretary: V. P. Gopcevic.

January 21-24, American Roadbuilders Association: 50th anniversary meeting, Hotel Rice, Houston. Association address: 1319 F St. NW, Washington 4. Secretary & executive vice president: Lt. Gen. Eugene Reybold.

January 21-25, American Institute of Electrical Engineers: Winter general meeting, Hotel Statler, New York. Institute address: 33 W. 39th St., New York 18. Secretary: H. H. Henline.

January 23-24, National Industrial Conference Board: Winter meeting, Waldorf-Astoria Hotel, New York. Address: 247 Park Ave., New York 17. Assistant director, conference division: (Mrs.) I. E. Brown.

January 24-25, Steel Plate Fabricators Association: Annual meeting, Palmer House, Chicago. Association address: 37 W. Van Buren St., Chicago 5. Secretary: J. Dwight Evans.

January 27-31, Associated Equipment Distributors Association: Annual meeting, Hotel Conrad Hilton, Chicago. Association address: 360 N. Michigan Ave., Chicago. Secretary: P. D. Herman.

January 28-30, Truck-Trailer Manufacturers Association: Annual meeting, Shamrock Hotel, Houston. Association address: 1024 National Press Bldg., Washington 4. Managing director: John B. Hulse.

January 31-February 1, American Society for Metals: Mid-winter meeting, William Penn Hotel, Pittsburgh. Society address: 7301 Euclid Ave., Cleveland 3. Secretary: W. H. Eisenman.

February 7-8, Instrument Society of America, New York Section: Power plant symposium, Hotel Statler, New York. Society address: 551 Fifth Ave., New York 17. Secretary: Richard Rimbach.

February 11-15, National Sand & Gravel Association: Biennial meeting, Hotel Conrad Hilton, Chicago. Association address: 1325 E St. NW, Washington 4. Executive secretary: Vincent P. Ahearn.

February 12, Chamber of Commerce of the United States: National conference on labor relations, Pittsburgh. Chamber address: 1615 H. St. NW, Washington 6. Executive vice president: Arch N. Booth.

TYGON PAINT OFFERS *"Down the Shelf"* RESISTANCE

That's right!! TYGON PAINT offers "down the shelf" resistance — resistance to acids and alkalies alike. Many coatings offer acid resistance, some offer alkali resistance — but, in TYGON you get both — plus resistance to oils, greases, water, and many solvents.

Just stop and think of the number of different chemicals used in your plant every day. Then, think of the advantages of having one coating — TYGON PAINT — to provide the multiple resistance required. Think of the complete protection — the savings in time and money — the minimum inventory — the convenience assured by using just one positive protective coating, by using TYGON PAINT.

"Down the shelf" resistance is particularly important in the metal finishing field where defense is needed against an array of chemicals which includes sulfuric acid, hydrochloric acid, hydrofluoric acid, caustic soda, soda ash, trisodium phosphate, the cyanides, the halides, the sulfates, Rochelle salts, and organic acids.

Alkali degreasing units, pickling and plating tanks, barrel platers, fume ducts and hoods, filters, dryers, fans and pumps are typical of the metal finishing equipment that can be fully protected against corrosive fumes and spillage with TYGON PAINT. Structural steel, piping, walls, and ceilings also benefit from TYGON protection.

In addition to its unusually high chemical resistance, TYGON PAINT can be applied by brushing or spraying — requires no more than normally good surface preparation. It dries quickly and gives a tough, smooth, flexible film that's non-flammable, long-lasting and easy to clean.

Why don't you try TYGON PAINT in your plant? You'll find it an economical, efficient answer to those troublesome, profit-eating corrosion problems.

Don't delay, write today for full details and technical information. Ask for Bulletin 720.

Address: U. S. Stoneware Co., Akron 9, Ohio
Plastics and
Synthetics
Division

TYGON
the corrosion-resistant
plastic
PAINT

2-61C

Iron and Steel *need protection too!*

If it's made of iron or steel,
and exposed to the elements,
remember to have it
Hot-Dip Galvanized—*sealed in zinc!*

HANLON-GREGORY
Galvanizing Company

Pittsburgh . . . Pennsylvania
The World's Largest Job Galvanizing Plant
A. J. DIEBOLD, President

in the heart of the STEEL INDUSTRY

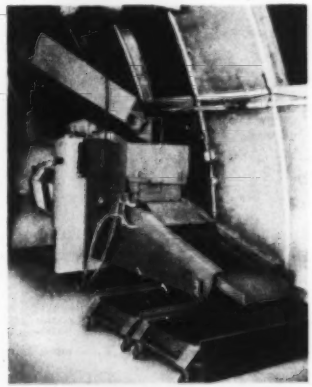
galvanizing . . . . pickling . . . . painting . . . . oiling

New Products and Equipment

Separator Speeds Tumbling

USE REPLY CARD—CIRCLE No. 1

Efficient time-saving facility for mechanical finishing, developed by Mecha - Finish Corp., Box 308, Sturgis, Mich., aids in separating parts from the abrasive and screening abrasive chips to size. Substantial reduction of downtime is attributed to application of this



. . . screens abrasive chips to size

unit, the Mecha-Finish stationary separator, to the tumbling process. In operation, a hoist pan of parts and chips is emptied into the hopper; with correct screen installed, abrasive is caught in another hoist pan beneath the unit and parts in a container at the end of the machine. Incorporated in the separator are flushing facilities to clean the parts and abrasive. Screens are changed easily and their oscillation is controlled.

Forging Process Redesigned

USE REPLY CARD—CIRCLE No. 2

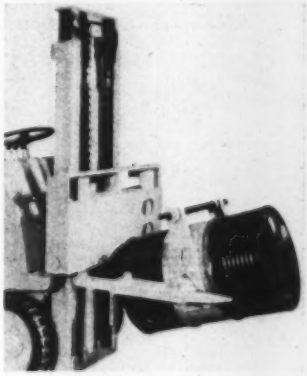
National Machinery Co., Tiffin, O., announces redesign of several features on its industrial forging press, the Maxipress. Band type brake is replaced by a water-cooled diaphragm disk brake that provides extreme stopping accuracy with negligible maintenance. Eccentric is increased in diameter and width and bearing area and overall shaft strength are 30 per cent greater.

Direct reading in tons can be taken from tonnage indicators. This immediately indicates overload, rating jobs for correct press size thereby prolonging press life. Presses are available in 13 sizes, from 300 to 8000 tons.

Lift Attachment Upends Drums

USE REPLY CARD—CIRCLE No. 3

Safe method of tilting and emptying heavy drums is provided by manual drum upender developed by Baker Industrial Truck Division, Baker-Raulang Co., 1250 W. 80th St., Cleveland 2, O. Upender consists of two shoes that slip over forks of any standard truck. Rubber faced grab plates that clamp around drum to hold it firm are



. . . fits on forks of any standard truck

welded to the shoes. An arm on each shoe supports the handle used to upend drums for emptying. Drums are carried in vertical position with handle latched to upender frame to prevent tipping. Unlatched and ready for emptying, the drum can be tilted as much as 45 degrees below horizontal. Device permits safe emptying from any height within comfortable arm reach of operator.

Hydraulic Hose Coupler

USE REPLY CARD—CIRCLE No. 4

Hydraulic hose coupling machine for making permanent hose assemblies is announced by Pyles Industries Inc., subsidiary of Aro Equipment Corp., Bryan, O. Machine is designed to permit hydraulic hose users to save time and cut costs by making their own assemblies. Machine is desk-size, taking 67 x 29 inches of floor space. It does a complete assembly and swaging job.

Machine's cutting wheel cuts hose to length, then wire wheel attachment skives each end. Sleeve is assembled manually by the operator on hose end, after which couplings are inserted by power spinner. Fitting stem is designed so hose tube stock is converted during swaging into a series of chevron-type packing rings that give positive seal. Standard machine is 115 v, 60 cycle single phase.

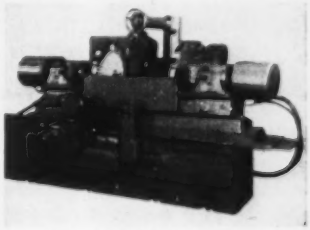
REPLY CARDS

on page 89 will bring you more information on any new products and equipment in this section.

Jet Blade Tip Grinder

USE REPLY CARD—CIRCLE No. 5

Plain cylindrical grinder developed for grinding jet engine rotor blade tips is announced by Landis Tool Co., Waynesboro, Pa. Machine is identified as a 30 x 48-inch type CHW plain grinder with special work heads. Each headstock drive is an alternating current motor, transmitting power by



. . . 30 x 48-inch unit has special heads

multiple V-belts. Twin headstocks with hydraulic chucking permit placing a complete jet rotor in grinding position on one headstock while another rotor with blades is ground.

When one grinding cycle is completed, carriage traverses, placing

IT'S ALL 'IN THE HEAD'

which is a Ⓑ Special!

The heads of these special bolts have a built-in determination to resist rotation within the molded rubber product encasing them. This extra holding power is all in the head—precision formed on our modern cold-heading machinery. Even though never seen by the customer, this bolt serves him well doing a special job of bonding the strength of steel with the resilience of rubber.

THIS Ⓑ MASSAGE CUP BOLT is typical of many molded-in-rubber applications in which the life of the product depends upon a special Ⓑ Bolt

APPLICATIONS Similar applications of rubber encased bolt heads are found in cushion mounts, automotive bumpers, vacuum cups, motor mountings, shockless suspensions and in track pads.

We have a "Special" answer

FOR EVERY "SPECIAL" PROBLEM

BUFFALO BOLT COMPANY

Division of Buffalo-Eclipse Corporation

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Sales Offices in Principal Cities. Export Sales Office: Buffalo International Corp., 50 Church Street, New York City

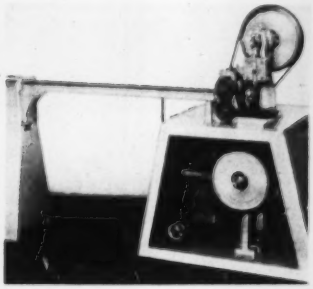
Our Specialty is **"SOMETHING SPECIAL"**

second head in grinding position. Controls are located so each head can be operated individually. Work carriage moves by hydraulic power. Grinding wheel is 30 x 3 x 12-inches, driven by a 15 hp motor.

Marking and Cutoff Machine

USE REPLY CARD—CIRCLE No. 6

Combination marking and cutoff machine for tags, plates, etc., is offered by Klaas Machine & Mfg. Co., 4330 E. 49th St., Cleveland 25, O. Feeder conveyor provides approach for the material to the units' two basic presses. Roll-feed attachment holds section to be



. . . two presses perform both operations

stamped or marked while one press performs the operation. Second press subsequently cuts off the piece.

Selection of lengths to be cut is available, as are widths and thicknesses. Among the wide variety of materials handled on the machine are aluminum, tin, plastic and solder. Machine's speed can be adjusted to suit material being processed, whether it is extruded or in finished form.

Handler Accessories Added

USE REPLY CARD—CIRCLE No. 7

Complete line of accessories and parts for the NesTier handling system is announced by Charles William Doepke Mfg. Co., Rossmoyne, O. Added to the line is a single unit dolly, designed to convey loaded hoppers from machine to machine along the production line. Made of wood, with four casters, it is sufficiently light for manual handling. Dolly holds six hoppers tiered, or 24 nested. It is also available in double unit size, with a grip handle. A caster truck made of heavy-gage structural

GOOD PRACTICE

WASTEFUL

CARE IN HANDLING, GOOD WELDING TECHNIQUES REDUCE ELECTRODE WASTE

You can get factory-fresh performance from your electrodes through good storage and protection practice. Don't waste electrodes by leaving them in damp corners or on floors where they can become saturated with moisture, stepped on, chipped, bent, or otherwise rendered useless.

Here are some other "ground rules" to follow to get up to 40% more from your electrodes:

1. **Avoid bending whenever possible**
2. **Use electrodes down to a 2-inch stub**
3. **Provide better fit-ups**
4. **Lay flat-face fillets on vertical fillet welds**
5. **Make fillet legs of equal length on horizontal fillets**

To get the most from your electrodes, get the best electrodes . . . specify General Electric. G-E electrodes give you high deposition rates, a smooth stable arc, meet AWS specifications and are available in a wide variety of sizes and types.

HERE'S A TIP! Stamp the date received on each electrode carton and use those with the earliest dates first.

FOR THE BEST IN ACCESSORIES . . .

See your authorized General Electric Welding Distributor. He carries a complete line of G-E accessories, including electrode carriers, electrode holders, helmets, lenses and cover glasses, hand shields, leather protective clothing, brushes, ground clamps, cable connectors and many other items.

Your G-E Welding Distributor can also give you additional hints on how to get the most from your electrodes and equipment. You can find his name in the yellow pages of your telephone directory. Look for "General Electric" under "Welding Equipment." General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

712-43

steel, is made available for heavier handling. Truck holds four stacks of hoppers—a total of 24 in tiered position or 144 nested. Steel plate conveyor tray, designed for overhead monorail system, is used in make-up systems. Tray can be used on either hand operated or motorized monorails and will hold nine tiered units.

Armor Plate Casting Scarfer

USE REPLY CARD—CIRCLE No. 8

Tolerances of plus or minus 1/64-inch are attributed to an armor plate casting scarfer developed by Cogmatic Co., 1330 N. Franklin Pl., Milwaukee 2, Wis. Machine precision trims the edges on double-curved surfaces, preparing welding surfaces to accepted industrial standards. In operation, two oxyacetylene torches are positioned over the casting by means of a number of articulated sections that follow machined tracks. Torch movements are effected by variable speed transmission through chains following the track and connecting to the sections. Torches cut castings to required apex in horizontal or vertical plane, around curves, and in some cases diverging from the original plane.

Tool Works Oil Pump Bodies

USE REPLY CARD—CIRCLE No. 9

Special machine tool that bores, drills, chamfers and reams oil pump bodies is a development of Cross Co., Detroit 7, Mich. One unskilled operator is needed to produce 95 pieces per hour at 100 per cent efficiency. Machine has six stations—one loading and five working. Quick, precise indexing is the result of a power operated trunnion equipped with fluid motor drive. In operation, the machine drills and reams shaft holes, rough and semi-bores gear pockets and center counterbore, drills intake hole and drills and chamfers screw holes. Front and rear faces are machined in a previous operation.

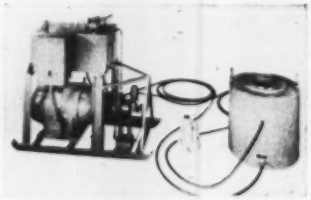
Other features include hydraulic feed, hardened and ground ways built to JIC standards, automatic lubrication and preset tools to speed tool changing and hold downtime to a minimum.

. . . one operator produces 95 pieces per hour at 100 per cent efficiency

Jack Capacity Is 600 Tons

USE REPLY CARD—CIRCLE No. 10

Center-hole puller jack, the Simplex "Jenny" is introduced by Templeton, Kenly & Co., Chicago. Operating on a 10 hp motor, unit is double acting for use in large electric plants. Ram weighs 1750 pounds. Two hand pumps are incorporated. After desired tonnage is attained with motor, extra tonnage can be added gradually and accurately with hand pumps.



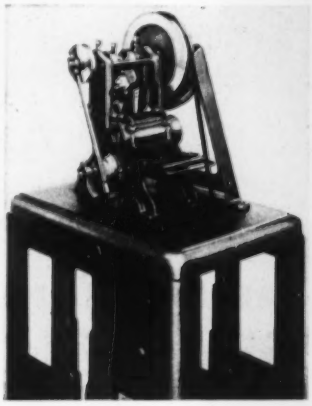
. . . center-hole principle cuts out torque

Outside diameter is 22 inches; height, 21 inches. Travel of 6½ inches is provided in a 7¾-inch hole. The jack's center-hole principle eliminates torque action. It pushes or pulls in a straight line, vertically or horizontally.

Vari-Speed Pulleys Drive Press

USE REPLY CARD—CIRCLE No. 11

Introduction of its redesigned high-speed Flexo-Press is announced by Ace Tool & Die Works, Cincinnati, O. It has an infinitely variable speed range of 150 to 600 rpm in cutting production materials such as wire insulation and light metals in uniform lengths to 9 inches. It stamps and forms small light parts and can be used for continuous high speed perforating of light metals. Production rates are recorded from 9000 to 36,000 pieces per hour.



. . . produces about 5:1 speed variation

Driving the press is a 1/3-hp, 1740 rpm motor, working through an arrangement of two No. 850 Reeves Vari-Speed motor pulleys. Pulley arrangement gives approximately 5:1 speed variation.

Unit Is Two-Motor Control

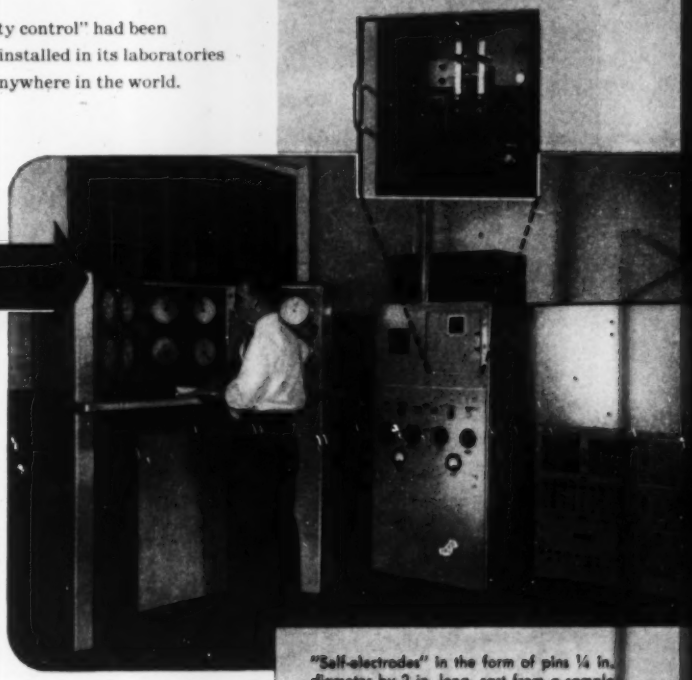
USE REPLY CARD—CIRCLE No. 12

Motor control center for use wherever two or more ac motors, maximum 200 hp, 600 v, are controlled from a central location is announced by General Electric Co., Schenectady 5, N. Y. Center is pre-engineered, factory wired and assembled, employs many standard

LEADERSHIP can't stand still

this time it advances on spectral waves

Way back in 1914, before the term "quality control" had been invented, The American Brass Company installed in its laboratories the *first* spectrograph used by industry anywhere in the world. Today, this Company, first in its field, has introduced the latest word in rapid analytical procedures, the . . .



"Self-electrodes" in the form of pins ¼ in. diameter by 2 in. long, cast from a sample of the melt to be analyzed, are accurately spaced in the electrode holders of the Baird Associates—DOW Direct Reading Spectrometer (top illustration). A button is pressed—and a 25,000-volt spark bridges the gap. Then...

Light from the spark falls on a grating and is reflected, in a separate spectrum line for each element, onto photomultiplier tubes. Seconds later, accurate, direct dial readings indicate the amount of alloying elements present and the amount of impurities, such as iron, nickel, manganese, aluminum, silicon, lead, arsenic, phosphorus and antimony.

With the analysis of the melt known to be right, a "go-ahead" is flashed to the casting shop and the metal is poured.

What it does

In five minutes by spectrochemical methods this instrument completes an analysis that would take several hours by spectrographic procedures and several days by the traditional methods of chemical analysis. Now an electric furnace charge of molten metal can be analyzed *before* it is poured.

What it means

This continuing leadership in the application of scientific developments to production has many practical advantages. For instance: In conserving copper and zinc by making maximum use of scrap in such an important alloy as cartridge brass. The rapid, complete analysis for metal content and impurities permits a high degree of control not otherwise possible. Thus, through the development of spectrochemical analysis you are assured of new high standards of uniformity in Anaconda Metals—unsurpassed by *any* in the industry. The American Brass Company, General Offices, Waterbury 20, Connecticut. 5267

ANACONDA

sets the pace in quality control of

COPPER and COPPER ALLOYS

Foundry Men! How much are STRAINER CORES costing you? Figure it out for yourself—right here

COST SHEET

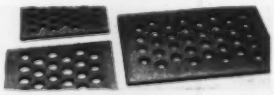
MATERIAL COST
Sand _____ Lb. @ _____ _____
Binder _____ Lb. @ _____ _____
Oil _____ Qt. @ _____ _____
Oil _____ Pt. @ _____ _____
BATCH MATERIAL COST _____
CORES PER BATCH _____
MATERIAL COST PER CORE _____
MIXING ROOM OVERHEAD _____ % ON MATL. COST _____
LABOR—CORE ROOM
_____ PC. PER HR. @ _____
OR
_____ PC. RATE _____
CORE ROOM OVERHEAD _____ % ON LABOR _____
CORE OVEN SPACE _____
COST PER UNIT (LB., TRAY, UNIT, ETC.)
_____ (WGT., AREA, PC., ETC.)
GROSS COST _____

DON'T OVERLOOK INDIRECT FACTORS AND OTHER ITEMS OF OVERHEAD!

ALSIMAG®

It is possible that the immediate cost of AlSiMag Ceramic Strainer Cores may be slightly more than your own, but don't forget—you have absolute assurance in their strength, uniformity and dependability. They save your castings. They save you money!

ALSIMAG CERAMIC STRAINER CORES fit into the gate of your mold to strain the metal and regulate its flow. Many shapes and sizes to choose from.



ALSIMAG CUT-OFF CORES make a weak joint between casting and riser. Save cut-off time. Cameron Cores, Patent No. 2,313,517 sold to Meehanite Licensees only.

SAMPLES FREE ON REQUEST. Test AlSiMag cores in your own foundry. Samples from sizes in stock sent free on request. Test samples to your own specifications at reasonable cost.

AMERICAN LAVA CORPORATION
CHATTANOOGA 5, TENNESSEE
49TH YEAR OF CERAMIC LEADERSHIP
OFFICES: Philadelphia • St. Louis • Cambridge, Massachusetts • Chicago
Los Angeles • Newark, N. J.

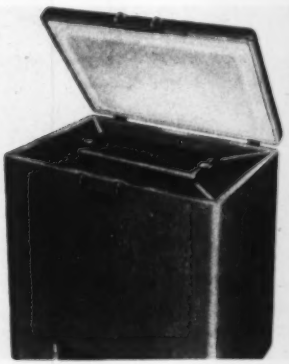
components and accessories. It provides simplified method of installing and servicing in a central location ac combination motor starters in NEMA sizes 1-5, as well as lighting panels and associated equipment for a group of motors.

Center is designed to withstand short circuit stresses to 25,000 amp. Its sections are 20 inches deep, 20 inches wide and 90 inches high. Four-inch vertical trough with cable supports runs full length of each section, providing space for wiring. Units are easily removable, simplifying inspection and servicing of starters.

Industrial Subzero Chest

USE REPLY CARD—CIRCLE No. 13

Revco Inc., Deerfield, Mich., announces its subzero chest for use in industrial testing, shrink-fit assembly and seasoning gages and



. . . sub-lid maintains constrant pressure

precision tools. Cabinet is available in two sizes, equipped with sub-lid to maintain constant temperature throughout storage compartment and minimize heat loss during use. Control is adjustable for any temperature to −90° F in the 1.5 cu ft model; in the 6.5 cu ft model, control reaches −80° F. Temperatures of −95° and −85° F respectively can be maintained by continuous running.

All-steel welded construction is sealed air and water tight inside and out. Units have high density, nonsetting Fiberglas bats to provide efficient insulation. Refrigeration system employs two Tecumseh hermetic compressors, operating in two stage systems. First

YOU will always remember the *quality* of Illinois gears, the fact that they meet specifications, that the finish and accuracy is right, that they are dependable.

You will never forget the service you get from Illinois Gear & Machine Company — on-time, as-promised deliveries — extra speed when you are in a tight spot — prompt attention to your requests and problems.

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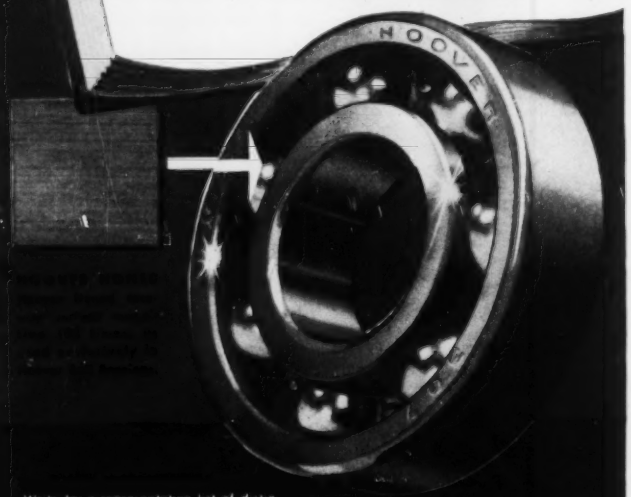
HOOVER HONED RACEWAY

The Distinguished User list of **HOOVER,** *America's only* **BALL BEARING** *with Honed Raceways reads like a* **"WHO'S WHO** *of American Industry"**



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30% GREATER LOAD
AMAZING QUIETNESS

The Aristocrat of Bearings

HOOVER BALL AND BEARING CO.
ANN ARBOR, MICHIGAN

stage is ¾-hp, the second, ¼-hp capacity. Current required is 110-120 v, ac, 60 cycle, single phase.

Intake Manifold Processer

USE REPLY CARD—CIRCLE No. 14

Twenty-two-station in line, transfer type special machine for processing intake manifold of v-type engine block is announced by Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. Machine drills, taps, reams and spotfaces all holes and mills carburetor and water outlet pad. Its capacity is 72 pieces per hour at 80 per cent efficiency. Loading is manual and controls are automatic in normal use, but can be switched to manual if desired.

Workpiece is located hydraulically and clamped at each station. Hydraulically operated transfer bar moves the piece between stations. Tools are high speed steel and carbide mill cutters, preset and changed manually. Tool speeds are 80 sq ft per minute in drilling operations and 250 sq ft per minute for milling. Fixtures move on v-type rails, hardened and ground to minimize wear. Floor space required is 10 x 40 feet.

Thread Ring Gages

USE REPLY CARD—CIRCLE No. 15

Pipe Machinery Co., Cleveland, O., offers titanium carbide thread ring gages. They are made to a high degree of accuracy and special wear check plugs are provided with each ring. This plug is a double end type with one end slightly larger to detect any possible wear.

Stainless Steel Packing Glands

USE REPLY CARD—CIRCLE No. 16

Conax Corp., Buffalo 21, N. Y., offers a series of packing glands designed for general use and ease of installation in process control, pilot plant or laboratory installations. They are available to accommodate tubes from ⅛ to 13/32-inch OD.

Dual Purpose Valve

USE REPLY CARD—CIRCLE No. 17

Designed for either a high pressure drop and small volume or a low pressure drop and large volume, No. 818 cast iron valve is offered by R-S Products Corp., Phil-

adelphia 44, Pa. It is used in a turbine bypass line for controlling the required quantity of water when turbine is not in use or when it is operating at reduced capacity.

Abrasives for Wet Blasting

USE REPLY CARD—CIRCLE No. 18

A complete line of abrasives for wet blasting machines is available from American Wheelabrator & Equipment Corp., Mishawaka, Ind. Sizes supplied range from 80 to 2500 mesh and are packaged in 50-pound weights for easy charging of the machine and storage simplification.

Cantilever Beam Load Cell

USE REPLY CARD—CIRCLE No. 19

An instrument for changing a mechanical force into a proportionate electrical signal that is transmitted to an indicator or recorder for evaluation is available from Automatic Temperature Control Co. Inc., Philadelphia 44, Pa. The load cell operates on the cantilever beam principle.

Paint Protects Metals

USE REPLY CARD—CIRCLE No. 20

A maintenance paint to protect metals subjected to temperatures in the range of 200 to 1000° F has been developed by Tropical Paint & Oil Co., Cleveland, O. Called Thermalite, it is a high heat aluminum paint that presents a clean smooth silver bright finish. It does not discolor, blister, flake or burn off in temperatures up to 1000° F.

Direct Reading Flowmeters

USE REPLY CARD—CIRCLE No. 21

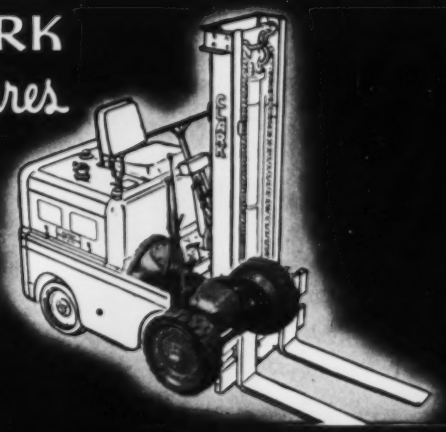
F. W. Dwyer Mfg. Co., Chicago 12, Ill., offers a flowmeter from which the line flow can be read directly regardless of any change in flow rate of gas or air in laboratory test work or when used as a replacement for sight feed bubblers. Standard unit includes a built in control valve.

Rust Preventive

USE REPLY CARD—CIRCLE No. 22

No. 0 rust preventive, available from Stop-Rust Co., Chattanooga, Tenn., is not a petroleum base product. It has the property of absorbing and evaporating moisture from pores of the metal so that

CLARK features



A CLUTCH YOU CAN CHANGE IN 80 MINUTES

LIFTING THE CLUTCH OUT OF POSITION

AT YOUR SERVICE

At the other end of your telephone is CLARK'S world-wide Service Organization ready to give you every needed help where you need it—when you need it. You'll find the Service Organization nearest you listed in your Classified Telephone Book under "Trucks, Industrial."

THE CLUTCH is far and away the most vulnerable part of a fork-lift truck. It takes the brutal strain, torture and wear each day of hundreds of stops, starts, "inching" maneuvers, shifts from forward to reverse and vice versa. In just one week of work it takes more punishment than your car's clutch takes in a year.

CLARK Engineering has produced a better clutch—a clutch that stands up longer under severe use than any other we know of in the fork-truck field. Yet even these superior clutches reach the point where replacement is an unavoidable necessity.

But here, too, CLARK Engineering has demonstrated its superiority by producing:

★ a truck design which is unrivalled for simplicity, speed and economy in the removal and replacement of a worn clutch . . . a design in which clutch-replacement requires a mere 80 minutes . . . less than an hour and a half!

This QUICK-CHANGE CLUTCH is just one of MANY good and important reasons why it pays to standardize on CLARK equipment for handling materials.

Fill in the coupon, attach it to your letterhead and mail it.

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REAM HOLES WITHIN .0002"!
145 Sizes and Styles In Stock
Barber-Colman reamers for Jig Boring Machines assure holes to size within .0002". All diameters are precision ground, relative for runout within .0001". A complete range of sizes and styles is available from stock. Reamers are furnished with tang shanks or tapped for drawbolt, in either long or short styles, to suit your requirements.
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981 ROCK STREET
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it does not seal moisture which can form rust or corrosion pockets under the protective film. It is applied at room temperature by brush, dip, spray or wiping on and can be removed by commercial solvents.

Multipurpose Grease

USE REPLY CARD—CIRCLE No. 23

Multifak 2 grease, introduced by The Texas Co., New York, N.Y., is an improved multipurpose grease that features excellent shear stability, resistance against water washing, and good pumpability at low temperatures. It is suitable for bearing lubrication over a wide range of temperatures and can be used efficiently for other industrial lubrication jobs.

Corrosion Free Extinguishers

USE REPLY CARD—CIRCLE No. 24

Corrosion free performance is attributed to a one quart fire extinguisher offered by General Detroit Corp., Detroit 7, Mich., and General Pacific Corp., Los Angeles 21, Calif. Corrosion arrester is made a part of the pump that purifies the liquid. Extinguisher is called the Quick Air Fire Guard.

Compound Sets Anchor Bolts

USE REPLY CARD—CIRCLE No. 25

Anchor bolts for permanently fastening machinery or any type of equipment to concrete can be easily and quickly set by using Por-Rok quick setting cement, made by Hallemite Mfg. Co., Cleveland 13, O. Used cold, the compound is self-bonding, self-leveling, oil resistant and will not shrink.

Tests Surface Hardness

USE REPLY CARD—CIRCLE No. 26

A pocket-size surface hardness testing instrument is available from Peabody Industries Inc., Detroit 3, Mich., for testing nonfer-

USE A
REPLY CARD
Just circle the corresponding number of any item in this section for more information.

Helpful Literature

74. Shell Molding

Bakelite Co. — "Bakelite Phenolic Resins for Foundry Molds and Cores" is 20-page illustrated technical manual which describes the Croning process of shell molding. Step-by-step procedure is shown photographically. Fundamentals of this shell sand molding process are discussed.

75. Abrasion Tester

Taber Instrument Corp. — 6-page bulletin 5105 is illustrated list of various type specimen holders used with the Abraser, a device which tests the abrasion resistance of such products as ceramic tile, linoleum, fabrics, paper and lacquer coatings. A few special holders are shown also.

76. Standard Taps

Detroit Tap and Tool Co.—36-page booklet is comprehensive catalog-listing of specific standardized taps for steel and other tough materials, cast iron, aluminum, magnesium and other light materials, zinc die cast metals, brass and plastics. Taps are made of chrome-cobalt high speed steel, but vary as to design and heat treatment for use with specific materials.

77. Steel Shop Equipment

Standard Pressed Steel Co.—Pictures, details and shipping weights of Hallowell cabinet benches, work benches, bench legs, drawers, shop desks, cabinets, tool stands, carts, stools and chairs are included in folder 808-1.

78. Forging Equipment

National Machinery Co.—"Our Job —Helping You Flow Metal" is title of 16-page illustrated brochure which briefly summarizes machines and techniques developed for modern forging. Special emphasis is given to such equipment as Maxipresses; cold headers; and bolt, nut, rivet and wire nail machinery.

79. Form Grinders

Sheffield Corp. — Now available with microscopes or viewing screens are these Micro-Form grinders designed to finish grind circular and flat form tools, templates, profile gages, cams and dies directly from the drawing. Full details are presented in 8-page illustrated booklet MFG-122-51.

80. Interfiling Punch Cards

Remington Rand Inc.—24-page illustrated folder TM 562 explains in chart form how punched card users can speed up and simplify preparation of records and reports through use of interfiling reproducing punch. Machine will compare two groups of cards, interfile matching and non-matching cards, segregate cards not to be interfiled and punch information from one set of cards to another.

81. Combustion Equipment

C. M. Kemp Mfg. Co.—28-page illustrated bulletin B-11 "Kemp Combustion Equipment" describes basic principle involved in operation of Kemp industrial carburetor. Seven types of burners, lighters and lighter tips, soldering irons, hand torches, fire pots, peep hole covers, observation ports, index and stop cocks and fire checks are covered.

82. Armor Plate Furnaces

Drever Co.—8-page illustrated bulletin "Armor Plate Furnaces and Equipment" explains features of continuous hardening, pressure quenching and tempering lines. Both oil and gas fired equipment is shown. Hardening data are tabulated.

83. Abrasive Points

Simonds Abrasive Co.—4-page catalog ESA-65-A describes line of abrasive mounted wheels and mounted points with removable spindles. Point or wheel screws on or off spindle without removing it from chuck. Standard sizes and shapes are listed and illustrated.

84. Portable Elevator

Economy Engineering Co.—500-lb, 1000-lb and 2000-lb capacity Shoplifter portable elevators are subject of 2-page information sheet 445. These manually operated units facilitate elevating of products from floor to height of 54 in. on sturdy forks.

85. Electric Lift Trucks

Raymond Corp.—Specifications and outstanding features of complete line of electric skid and pallet trucks are found in 4-page bulletin 703. High and low pallet stacking models in 2000 and 3000-lb capacities are shown along with low-lift rider type offered in two models.

86. Magnetic Brakes

Dings Brakes, Inc.—Design and operation of direct-acting alternating and direct current type magnetic brakes are subject of 4-page illustrated bulletin B-4000-A. Models are available with torque ratings of 10 to 90 lb-ft for continuous and intermittent duty. Formulas to aid in selection of proper size are given.

FOR MORE INFORMATION USE ONE OF THESE CARDS . . .

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HELPFUL LITERATURE

87. X-Ray Equipment

Picker X-Ray Corp.—14-page illustrated folder "If It Has To Do with X-Ray, Then It Has To Do with Picker" describes line of equipment for fluoroscopic inspection, apparatus and accessories for taking radiographs, darkroom essentials for processing radiographs and supplementary equipment for viewing radiographs.

88. Hard-Facing Rods

Victor Equipment Co.—Company offers five bulletins covering complete line of hard-facing alloy rods. These include Tungsmooth for electric or acetylene application, Victortube for the same, and Victoralloy, a fabricated rod containing alloys in a tube and coated with high alloy coating, designed for resistance to abrasion and impact.

89. Hydraulic Presses

Denison Engineering Co.—"Multipress for Defense Production" is title of 8-page illustrated technical bulletin 141 which describes HydrOILic Multipress used for hydrostatic testing of rocket motor bodies and for automatic shell-banding operations.

90. Industrial Instruments

Century Geophysical Corp.—Two illustrated 2-page data sheets CGC-304 and CGC-305 deal with linear integrating amplifier for mobile and airborne testing, and with recording oscillograph which is capable of producing 200 ft of 8-in. bromide paper records.

91. Sliding Head Drill

Cincinnati Lathe & Tool Co.—Described and illustrated in 8-page brochure D-108 are 16-in. 3000 sliding head, box column floor and bench model drills, with both single and multiple spindles. Features include six speeds, V-belt drive and full-floating spindle. Bulletin 115V formerly used to describe these drills is supplemented.

92. Silicon Carbide Crucibles

Electro Refractories & Abrasives Corp.—Dimensions, capacities and other data on Tercod silicon carbide crucibles for aluminum and brass melting are given in 4-page illustrated bulletin T-152. Details of pedestal blocks, crucible lids, furnace linings, covers and cements are included.

93. Traveling Cranes

Reading Chain & Block Corp.—16-page illustrated bulletin "The Why and How of Faster Production" uses actual installation views to show where Reading traveling cranes can be used advantageously in industrial plants for handling all types of materials and equipment. Various components which comprise the finished cranes are described briefly.

94. Circular Cutters

W. F. Meyers Co.—Solid carbide and carbide tipped Meyco precision circular cutters made in various diameters and thicknesses to meet individual requirements are subject of 4-page illustrated folder.

95. Cam Rise Gage

F. T. Griswold Mfg. Co.—A gaging system developed to measure cam contours by direct-reading optical means is covered in bulletin. Also illustrated and described is optical dividing head for positioning camshafts and optical cam rise gage by which measurements at any angle of arc can be made by rotating microscope dial.

96. Coolant

Colloids, Inc.—Data sheet on Coolant 927 explains use of this compound as cutting oil for aluminum. It is also suitable as a lubricant for extrusion, stamping, molding and other operations.

97. Metallurgy in Tool Design

Illinois Tool Works—"Metallurgy in Tool Design and Production" is title of 16-page illustrated editorial-style booklet. It relates techniques involved in production of metal cutting tools by company. Laboratory analysis, forging, heat treating and surface treatments are among subjects covered.

98. Safety & Relief Valves

Kunkle Valve Co.—Bronze, iron and steel safety and relief valves for original equipment are described and illustrated in 4-page data sheet. Valves are for air, gas, steam and liquid relief. Service recommendations and specifications are included.

99. Drawing Compounds

E. F. Houghton & Co.—Physical properties and applications of drawing compounds for every type of drawing operation are given in revised 4-page folder "Drawing Compounds by Houghton." It is divided into sections on general purpose, nonferrous, magnesium, aluminum and steel drawing.

100. Small Drives

Metron Instrument Co.—Miniature combination fixed and variable speed drives for use in low power applications requiring variable speed at reduced nominal output speed are subject of technical data sheet No. M1.

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rous extrusions, castings, machined parts and fabrications. It features direct reading scales, one incorporates accurately correlated numerical equivalents of the Brinell 500 kg, 10 mm ball testing equipment and the Metalometer scale.

Aluminum Coiled Tube

USE REPLY CARD—CIRCLE No. 27

Aluminum Co. of America, Pittsburgh 19, Pa., announces Utilitube, a general purpose aluminum coiled tube made of Alcoa aluminum alloy B50S-O. It can be used in fuel oil, gasoline and lubricating oil lines for internal combustion engines; in fuel gas lines for heaters also in air, vacuum and hydraulic lines for brakes and instruments.

Lathe Tool Holder

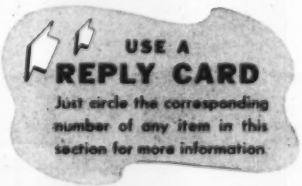
USE REPLY CARD—CIRCLE No. 28

Designated as DTRL, a Follower lathe tool holder is introduced by Wesson Co., Ferndale, Mich. It uses a 55 degree diamond shaped solid Wessonmetal insert and is able to cut in either direction. Ample clearance is provided on both sides of the diamond insert to permit the multicutting action. Holders can be used on either, or simultaneously, both sides of the work. They can also be locked in position right side up or upside down.

Removes Liquids Automatically

USE REPLY CARD—CIRCLE No. 29

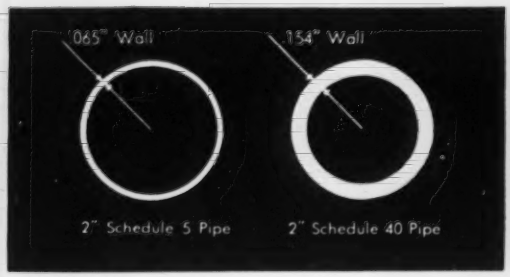
C. A. Norgren Co., Englewood, Colo., developed a filter-drain that provides automatic removal of liquids and solids from compressed air lines with automatic drainage of collected liquids. Unit operates automatically under constant or fluctuating air pressure and air flow. It continues to operate when flow of air is cut off. It is available in $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$-inch pipe thread sizes for in-line pipe connection installations.

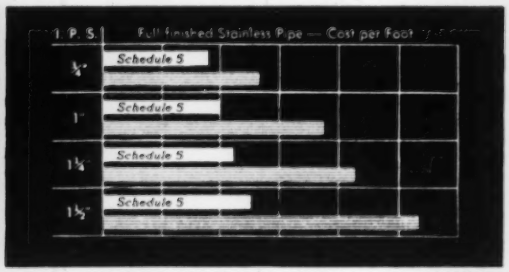


From golf clubs
to machine tools
For finishing tricky combinations of wood and metal, a prominent golf club manufacturer has found that nothing equals heat-resistant Jewelox Cloth belts. Like all Jewel Brand Abrasive Belts they have the exclusive, smooth-running Velvet Joint.
Another grade of Jewel Brand Coated Abrasives is used for sanding the filling coat on heavy machine tools. The rough surface, plus a heavy coat of paint, makes this a tough job . . . but not too tough for Jewel Brand "open coat" New Process paper.
THERE'S A JEWEL BRAND COATED ABRASIVE to do every job, large or small, and to do that job quicker, cleaner, at lower cost! Ask your industrial distributor or write for catalog. Abrasive Products, Inc., 561 Pearl Street, South Braintree 85, Mass.
SHARPER, TOUGHER
Jewel COATED Abrasives
CUT COSTS!

how *Carpenter* is helping industry get more stainless pipe

—even today, when it's tough to get!





Comparison of costs with Schedule 40 shows savings of 10% to 45% with *Schedule 5*. Additional savings on costs for valves, fittings, etc. are also possible.

What Carpenter *Schedule 5* Pipe Is—

Its LIGHT WALL gives *more feet of pipe* for every pound of Stainless Steel. Cost is 40% to 50% lower. Larger I.D. increases flow area and permits use of a smaller pipe size.

You now have a way to help us improve the availability of Stainless Pipe for essential uses. And you can do it at a terrific saving in your costs.

You can hook up *Schedule 5* Pipe with existing lines of tubing or heavier wall pipe, Schedules 10 and 40.

For most jobs Carpenter *Schedule 5* Stainless Pipe handles the working pressures with a good margin of safety. Any working pressure up to 150 psi is handled by this pipe. In pipe sizes under 1½", higher pressures are frequently used.

More Stainless Pipe for essential uses is possible, even under today's conditions. To get the full story, call your nearest Carpenter Stainless Tubing Distributor. Or, write for a copy of the new "*Schedule 5* Data Sheets". We will be glad to send you a set.

THE CARPENTER STEEL COMPANY
Alloy Tube Division, Union, N. J.
Export Department: Carpenter Steel Co., Reading, Pa.—"CARSTEELCO"

Carpenter

STAINLESS TUBING & PIPE

Analysis · Tolerance · Finish

· guaranteed on every shipment

The Market Outlook

TIGHTENING supplies of steel, copper and aluminum under impact of expanding defense requirements are beginning to really hurt. Dislocations attending accelerated shift in emphasis from butter to guns threatens economic distress in coming months unless defense activities increase to offet the contraction in civilian goods manufacture. We already have serious unemployment in spots, notably in the automotive industry. And pressure for relief promises to mount as the wheels of civilian goods industry slow down further for lack of adequate supplies of steel and other basic metals and materials.

RELIEF—In an election year anything can happen. But as things stand it looks like the supply squeeze will continue to tighten. In his message to the Congress the President asked for greater defense production and there appears slight chance of any significant modification of supply allocation programs or production controls. Last week Controlled Materials Plan was tightened in two ways and relaxed in one. Manufacturers were told they cannot use more controlled materials in any quarter than they are allotted for the period. The regulation covering self-certification of priorities by smaller consumers was tightened. At the same time, NPA revised controls on delayed deliveries, permitting carryover tonnage from one quarter to another to be charged against the quarter for which it was ordered.

ALLOCATIONS—Critical shortages of controlled materials are reflected in proposed additional cuts in second quarter allotments. Automobiles will get enough steel for 900,000 cars but only enough copper and aluminum for 800,000. Indusrial expansion will be slowed down, there being only enough steel and other metals for projects under way and urgent new starts. Commercial building will be hit harder and housing will be cut further. Makers of fans, blowers, electric motors, pumps, valves, etc., will get substantial supplies to avoid bottlenecks in military production, but components demand will be trimmed. Consumer goods will be cut about 10 per cent though a few less essential items, such as jewelry, will get slightly larger allotments of supplies. Production of railroad equipment will be slashed about 14 per cent, output of freight cars being scheduled at 15,000 against 18,000 in first quarter.

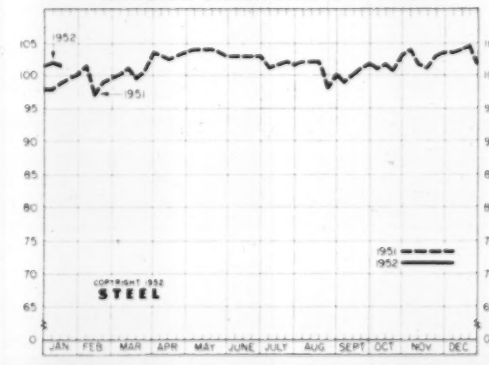
SUPPLY—Defense Production Administrator Manly Fleischmann, explaining the shortages, points to the large increase in direct and indirect materials needs for military and atomic energy programs. In the case of brass mill products, stainless steel and aluminum, such needs take more than half available tonnage. Nearly 50 per cent of alloy steel production and 20 per cent of carbon steel output are going for defense in one way or another. An additional 75 million pounds of straight chromium stainless steel in all forms except tubing have been made available by DPA for shipment to fabricators in first quarter.

PRODUCTS—Steelmakers' second quarter order books are filling rapidly. Carryover from fourth quarter was substantial and expectatons are it will be heavy into second quarter. Carryover is reported even in the light, flat-rolled products which have been under less consumer pressure of late. Light gage plates are in better supply balance due to increased production on continuous mills, but heavy gages are in critical supply. Bars are scarce and promise to tighten further in step with defense needs. Structurals are scarce but better balance is seen by midyear.

PRODUCTION—Shortage of scrap forced some production curtailment, especially in the Pittsburgh and Chicago districts, and the only immediate hope for relief over coming weeks appears to be through heavy allocation of tonnage from points more comfortably positioned with respect to reserves. Last week the national ingot rate slipped ½ point to 101.5 per cent of capacity.

PRICES—Steel and related products prices hold unchanged. There is considerable speculation in the trade though with respect to the outcome of current wage negotiations and the ultimate effect on prices.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended Jan. 12	Change	Same Week 1951	Same Week 1950
Pittsburgh	96.5	+ 0.5*	97.5	98
Chicago	101.5	+ 2*	101.5	98
Mid-Atlantic	101.5	0	100	88
Youngstown	106	0	105	102
Wheeling	104	+ 2	95	100
Cleveland	98.5	— 5.5*	103	98.5
Buffalo	104	0	104	103.5
Birmingham	104	0	100	100
New England	91	+ 2	88	83
Cincinnati	103	+ 1*	92	96
St. Louis	78	+ 19.5*	95	86.5
Detroit	106	2*	107	107
Western	107.5	+ 5.5	102	92
Estimated national rate	101.5	— 0.5	99	94

Based on weekly steelmaking capacity of 1,999,034 tons for 1951-52; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.

* Change from revised rate for preceding week.

The Metalworking Outlook—p. 17 Production Engineering News—p. 53

Composite Market Averages

FINISHED STEEL INDEX, Weighted:	Jan. 10 1952	Week Ago	Month Ago	Year Ago	5 Yrs Ago
Index (1935-39 av. = 100)	171.92†	171.92†	171.92	171.92	117.90
Index in cents per lb.	4.657†	4.657†	4.657	4.657	3.194
ARITHMETICAL PRICE COMPOSITES					
Finished Steel, NT	$106.32†	$106.32†	$106.32	$105.55	$68.46
No. 2 Fdry. Pig Iron, GT	52.54	52.54	52.54	52.54	30.17
Basic Pig Iron, GT	52.16	52.16	52.16	52.16	29.56
Malleable Pig Iron, GT	53.27	53.27	53.27	53.27	30.79
Steelmaking Scrap, GT	43.00	43.00	43.00	45.50	31.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

† Preliminary.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS	Jan. 10 1952	Week Ago	Month Ago	Year Ago	5 Yrs Ago
Bars, H.R., Pittsburgh	3.70	3.70	3.70	3.70	2.60
Bars, H.R., Chicago	3.70	3.70	3.70	3.70	2.60
Bars, H.R. del. Philadelphia	4.223	4.223	4.223	4.18	2.98
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.55	3.20
Shapes, Std., Pittsburgh	3.65	3.65	3.65	3.65	2.50
Shapes, Std., Chicago	3.65	3.65	3.65	3.65	2.50
Shapes, del. Philadelphia	3.918	3.918	3.918	3.90	2.64
Plates, Pittsburgh	3.70	3.70	3.70	3.70	2.65
Plates, Chicago	3.70	3.70	3.70	3.70	2.65
Plates, Coatesville, Pa.	4.15	4.15	4.15	4.15	2.90
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.70	2.90
Plates, Claymont, Del.	4.15	4.15	4.15	4.15	2.90
Sheets, H.R., Pittsburgh	3.60-75	3.60-75	3.60-75	3.60-75	2.50
Sheets, H.R., Chicago	3.60	3.60	3.60	3.60	2.50
Sheets, C.R., Pittsburgh	4.35	4.35	4.35	4.35	3.20
Sheets, C.R., Chicago	4.35	4.35	4.35	4.35	3.20
Sheets, C.R., Detroit	4.55	4.55	4.55	4.55	3.335
Sheets, Galv., Pittsburgh	4.80	4.80	4.80	4.80	3.55
Strip, H.R., Pittsburgh	3.75-4.00	3.75-4.00	3.75-4.00	3.75-4.00	2.50
Strip, H.R., Chicago	3.50	3.50	3.50	3.50	2.50
Strip, C.R., Pittsburgh	4.65-5.35	4.65-5.35	4.65-5.35	4.65-5.35	3.20
Strip, C.R., Chicago	4.90	4.90	4.90	4.50-4.90	3.30
Strip, C.R., Detroit	4.85-5.60	4.85-5.60	4.85-5.60	4.35-5.60	3.335
Wire, Basic, Pittsburgh	4.85-5.10	4.85-5.10	4.85-5.10	4.85-5.10	3.30
Nails, Wire, Pittsburgh	5.90-6.20	5.90-6.20	5.90-6.20	5.90-6.20	3.75
Tin plate, box, Pittsburgh	$8.70	$8.70	$8.70	$8.70	$5.75
SEMIFINISHED					
Billets, forging, Pitts. (NT)	$66.00	$66.00	$66.00	$66.00	$50-$54
Wire rods, $\frac{7}{32}$-$\frac{9}{32}$", Pitts.	4.10-30	4.10-30	4.10-30	4.10-30	2.55
PIG IRON, Gross Ton					
Bessemer, Pitts.	$53.00	$53.00	$53.00	$53.00	$31.00
Basic, Valley	52.00	52.00	52.00	52.00	30.00
Basic, del. Phila.	56.61	56.61	56.61	56.39	32.01
No. 2 Fdry., Pitts.	52.50	52.50	52.50	52.50	30.50
No. 2 Fdry., Chicago	52.50	52.50	52.50	52.50	30.50
No. 2 Fdry., Valley	52.50	52.50	52.50	52.50	30.50
No. 2 Fdry., Del. Phila.	57.11	57.11	57.11	56.89	32.51
No. 2 Fdry., Birm.	48.88	48.88	48.88	48.88	26.88
No. 2 Fdry. (Birm.) del. Cin.	55.49	55.49	55.49	55.58	31.75
Malleable, Valley	52.50	52.50	52.50	52.50	30.50
Malleable, Chicago	52.50	52.50	52.50	52.50	30.50
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	66.00	37.50
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	188.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton (including broker's commission)					
No. 1 Heavy Melt., Pitts.	$44.00	$44.00	$44.00	$46.50	$32.50
No. 1 Heavy Melt., E. Pa.	42.50	42.50	42.50	45.00	33.75
No. 1 Heavy Melt., Chicago	42.50	42.50	42.50	45.00	30.00
No. 1 Heavy Melt., Valley	44.00	44.00	44.00	46.25	33.25
No. 1 Heavy Melt., Cleve.	43.00	43.00	43.00	45.75	32.50
No. 1 Heavy Melt., Buffalo	43.00	43.00	43.00	44.88	33.00
Rails, Rerolling, Chicago	52.50	52.50	52.50	67.00	38.50
No. 1 Cast, Chicago	49.00*	49.00*	49.00*	62.00	42.50

* F.o.b. shipping point.

COKE, Net Ton					
Beehive, Furn. Connsvl.	$14.75	$14.75	$14.75	$14.75	$8.75-$9
Beehive, Fdry. Connsvl.	17.50	17.50	17.50	17.50	9.75-$10
Oven, Fdry. Chicago	23.00	23.00	23.00	23.00	15.10
NONFERROUS METALS					
Copper, del. Conn.	24.50	24.50	24.50	24.50	19.50
Zinc, E. St. Louis	19.50	19.50	19.50	17.50	10.50
Lead, St. Louis	18.80	18.80	18.80	16.80	12.80
Tin, New York	103.00	103.00	103.00	173.00	70.00
Aluminum, del.	19.00	19.00	19.00	19.00	15.00
Antimony, Laredo, Tex.	50.00	50.00	50.00	32.00	28.25
Nickel, refinery, duty paid	58.50	58.50	58.50	58.50	35.00

PIG IRON

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax. Key to producing companies published on second following page.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa. B2	$54.00	$54.50	$55.00	$55.50
Brooklyn, N.Y., del.	....	59.18	59.68	....
Newark, del.	56.87	57.37	57.87	58.37
Philadelphia, del.	56.61	57.11	57.61	58.11
Birmingham District				
AlabamaCity, Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward, Ala. W15	48.38	48.88	....	....
Cincinnati, del.	....	55.49	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda, N.Y. W12	52.00	52.50	53.00	....
No. Tonawanda, N.Y. T9	....	52.50	53.00	....
Boston, del.	62.11	62.61	63.11	....
Rochester, N.Y., del.	54.88	55.38	55.88	....
Syracuse, N.Y., del.	55.91	56.41	56.91	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary, Ind. U5	52.00	....	52.50	....
IndianaHarbor, Ind. I-2	52.00	....	52.50	....
So. Chicago, Ill. W14	52.00	52.50	52.50	....
So. Chicago, Ill., Y1	52.00	52.50	52.50	....
So. Chicago, Ill. U5	52.00	....	52.50	53.00
Milwaukee, del.	54.06	54.56	54.56	55.06
Muskegon, Mich., del.	....	58.47	58.47	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, O., del. from Cleve.	54.61	55.11	55.11	55.61
Lorain, O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie, Pa. I-3	52.00	52.50	52.50	53.00
Everett, Mass. E1	....	*57.50	*58.00	....
Fontana, Calif. K1	58.00	*58.50	....	....
Seattle, Tacoma, Wash., del.	....	60.66	....	....
Portland, Oreg., del.	....	60.66	....	....
LosAngeles, SanFrancisco, del.	60.16	60.66	....	....
GraniteCity, Ill. G4	53.90	54.40	54.90	....
St. Louis, del. (inc. tax)	54.66	55.16	55.66	....
Ironton, Utah C11	52.00	52.50	....	....
Geneva, Utah C11	52.00	52.50	....	....
LoneStar, Tex. L6	48.00	*48.50	48.50	....
Minnequa, Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
NevilleIsland, Pa. P6	....	52.50	52.50	53.00
Pitts., N.&S. sides, Ambridge, Aliquippa, del.	....	53.80	53.80	54.30
McKeesRocks, del.	....	53.54	53.54	54.04
Lawrenceville, Homestead, McKeesport, Monaca, del.	....	54.07	54.07	54.57
Verona, del.	....	54.57	54.57	55.07
Brackenridge, del.	....	54.82	54.82	55.32
Bessemer, Pa. U5	52.00	....	52.50	53.00
Clairton, Rankin, So. Duquesne, Pa. U5	52.00	....	....	....
McKeesport, Pa. N3	52.00	....	....	53.00
Monessen, Pa. P7	54.00	....	52.50	53.00
Sharpsville, Pa. S6	....	....	55.00	55.50
Steelton, Pa. B2	54.00	54.50	55.00	55.50
Swedeland, Pa. A3	56.00	56.50	57.00	57.50
Toledo, O. I-3	52.00	52.50	52.50	53.00
Cincinnati, del.	57.47	57.97	....	....
Troy, N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard, O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield, O., del.	56.65	57.15	57.15	57.65

* Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% of portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY IRON, Gross Ton (Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)	
Jackson, O. G2, J1	$62.50
Buffalo H1	63.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton	
(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)	
NiagaraFalls, N.Y. P18	$88.00
Keokuk, Iowa, Openhearth & Fdry., frt. allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2	95.50
Wenatchee, Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton (Low phos semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)	
Lyles, Tenn. T3	$66.00

LOW PHOSPHOROUS PIG IRON, Gross Ton	
Cleveland, intermediate, A7	$57.00
Steelton, Pa. B2	60.00
Philadelphia, delivered	63.27
Troy, N.Y. R2	60.00

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Semifinished and Finished Steel Products

Mill prices quoted under GCPR as reported to STEEL, Jan. 10, 1952; cents per pound except as otherwise noted. Changes shown in Italics. Code numbers following mill points indicate producing company; key on next two pages

INGOTS, Carbon, Forging (NT)
Fontana,Calif. K1 ....$79.00
Munhall,Pa. U5 ....52.00

INGOTS, Alloy (NT)
Detroit R7 ....$54.00
Fontana,Calif. K1 ....80.00
Houston,Tex. S5 ....82.00
Midland,Pa. C18 ....54.00
Munhall,Pa. U5 ....54.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. U5 ....$56.00
Clairton,Pa. U5 ....56.00
Ensley,Ala. T2 ....56.00
Fairfield,Ala. T2 ....56.00
Fontana,Calif. K1 ....75.00
Gary,Ind. U5 ....56.00
Johnstown,Pa. B2 ....56.00
Lackawanna,N.Y., B2 ....56.00
Munhall,Pa. U5 ....56.00
So.Chicago,Ill. U5 ....56.00
So.Duquesne,Pa. U5 ....56.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$66.00
Buffalo R2 ....66.00
Canton,O. R2 ....66.00
Clairton,Pa. U5 ....66.00
Cleveland R2 ....66.00
Conshohocken,Pa. A3 ....73.00
Detroit R7 ....66.00
Ensley,Ala. T2 ....66.00
Fairfield,Ala. T2 ....66.00
Fontana,Calif. K1 ....85.00
Gary,Ind. U5 ....66.00
Geneva,Utah C11 ....66.00
Houston,Tex. S5 ....74.00
Johnstown,Pa. B2 ....66.00
Lackawanna,N.Y. B2 ....66.00
LosAngeles B3 ....85.00
Munhall,Pa. U5 ....66.00
Seattle B3 ....85.00
So.Chicago R2,U5,W14 ....66.00
So.Duquesne,Pa. U5 ....66.00
So.SanFrancisco B3 ....85.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ....$70.00
Buffalo R2 ....70.00
Canton,O. R2 ....70.00
Canton,O.(29) T7 ....66.00
Conshohocken,Pa. A3 ....77.00
Detroit R7 ....73.00
Fontana,Calif. K1 ....89.00
Gary,Ind. U5 ....70.00
Houston,Tex. S5 ....78.00
Ind.Harbor,Ind. Y1 ....70.00
Johnstown,Pa. B2 ....70.00
Lackawanna,N.Y. B2 ....70.00
LosAngeles B3 ....90.00
Massillon,O. R2 ....70.00
Midland,Pa. C18 ....70.00
Munhall,Pa. U5 ....70.00
So.Chicago R2,U5,W14 ....70.00
So.Duquesne,Pa. U5 ....70.00
Struthers,O. Y1 ....70.00
Warren,O. C17 ....70.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 ....$82.00
Cleveland R2 ....82.00
Fontana,Calif. K1 ....103.00
Gary,Ind. U5 ....82.00
Massillon,O. R2 ....82.00
So.Chicago,Ill. R2 ....82.00
So.Duquesne,Pa. U5 ....82.00

SHEET BARS (NT)
Fontana,Calif. K1 ....$89.00

SKELP
Aliquippa,Pa. J5 ....$3.45
Munhall,Pa. U5 ....3.35
Warren,O. R2 ....3.35
Youngstown R2, U5 ....3.35

WIRE RODS
Alton,Ill. L1 ....4.40
AlabamaCity,Ala. R2 ....4.10
Buffalo W12 ....4.10
Cleveland A7 ....4.10
Donora,Pa. A7 ....4.10
Fairfield,Ala. T2 ....4.10
Fontana,Calif. K1 ....4.90
Houston,Tex. S5 ....4.50
Johnstown,Pa. B2 ....4.10
Joliet,Ill. A7 ....4.10
LosAngeles B3 ....4.90
Minnequa,Colo. C10 ....4.35
Monessen,Pa. P7 ....4.10
No.Tonawanda,N.Y. B11 ....4.10
Pittsburg,Calif. C11 ....4.75
Portsmouth,O. P12 ....4.30
Roebling,N.J. R5 ....4.20
So.Chicago,Ill. R2 ....4.10
SparrowsPoint,Md. B2 ....4.20
Sterling,Ill.(1) N15 ....4.10
Struthers,O. Y1 ....4.10
Torrance,Calif. C11 ....4.90
Worcester,Mass. A7 ....4.40

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ....1.45
Lackawanna,N.Y. B2 ....4.45
Munhall,Pa. U5 ....4.45
So.Chicago,Ill. U5 ....4.45

STRUCTURALS
Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 ....3.60
Aliquippa,Pa. J5 ....3.65
Bessemer,Ala. T2 ....3.65
Bethlehem,Pa. B2 ....3.70
Clairton,Pa. U5 ....3.65
Fairfield,Ala. T2 ....3.65
Fontana,Calif. K1 ....4.25
Gary,Ind. U5 ....3.65
Geneva,Utah C11 ....3.65
Houston,Tex. S5 ....4.05
Ind.Harbor,Ind. I-2 ....3.65
Johnstown,Pa. B2 ....3.70
KansasCity,Mo. S5 ....4.25
Lackawanna,N.Y. B2 ....3.70
LosAngeles B3 ....4.25
Minnequa,Colo. C10 ....4.10
Munhall,Pa. U5 ....3.65
Niles,Calif.(22) P1 ....4.85
Phoenixville,Pa. P4 ....5.90
Portland,Oreg. O4 ....4.50
Seattle B3 ....4.30
So.Chicago,Ill. U5, W14 ....3.65
So.SanFrancisco B3 ....4.20
Torrance,Calif. C11 ....4.25
Weirton,W.Va. W6 ....3.90

Alloy Stand. Shapes
Clairton,Pa. U5 ....4.35
Fontana,Calif. K1 ....5.55
Munhall,Pa. U5 ....4.35
So.Chicago,Ill. U5 ....4.35

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 ....5.50
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa.(14) B2 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.10
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Ind.Harbor,Ind. I-2 ....5.50
Ind.Harbor,Ind. Y-1 ....6.00
Johnstown,Pa. B2 ....5.50
Lackawanna,N.Y.(14) B2 ....5.50
LosAngeles B3 ....6.05
Munhall,Pa. U5 ....5.50
Seattle B3 ....6.10
So.Chicago,Ill. U5 ....5.50
So.SanFrancisco B3 ....6.00
Struthers,O. Y1 ....6.00

Wide Flange
Bethlehem,Pa. B2 ....3.70
Clairton,Pa. U5 ....3.65
Fontana,Calif. K1 ....4.65
Lackawanna,N.Y. B2 ....3.70
Munhall,Pa. U5 ....3.65
So.Chicago,Ill. U5 ....3.65

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 ....5.50
Lackawanna,N.Y. B2 ....5.50
Munhall,Pa. U5 ....5.45
So.Chicago,Ill. U5 ....5.45

BEARING PILES
Munhall,Pa. U5 ....3.65
So.Chicago,Ill. U5 ....3.65

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 ....5.65
Bessemer,Ala. T2 ....5.65
Clairton,Pa. U5 ....5.65
Cleveland J5, R2 ....5.65
Conshohocken,Pa. A3 ....5.90
Fairfield,Ala. T2 ....5.65
Fontana,Calif.(30) K1 ....6.25
Gary,Ind. U5 ....5.65
Geneva,Utah C11 ....5.65
Ind.Harbor,Ind. I-2 ....5.65
Ind.Harbor,Ind. Y1 ....5.15
Johnstown,Pa. B2 ....5.65
Munhall,Pa. U5 ....5.65
Pittsburgh J5 ....5.65
Seattle B3 ....6.55
Sharon,Pa. S3 ....5.70
So.Chicago,Ill. U5 ....5.65
SparrowsPoint,Md. B2 ....5.65
Warren,O. R2 ....5.65
Youngstown Y1 ....6.15

PLATES, Open-Hearth Alloy
Claymont,Del. C22 ....4.85
Coatesville,Pa. L7 ....5.25
Conshohocken,Pa. A3 ....5.90
Fontana,Calif. K1 ....5.55
Gary,Ind. U5 ....4.75
Johnstown,Pa. B2 ....4.75
Munhall,Pa. U5 ....4.75
Sharon,Pa. S3 ....5.20
So.Chicago,Ill. U5 ....4.75
SparrowsPoint,Md. B2 ....4.75

FLOOR PLATES
Cleveland J5 ....4.75
Conshohocken,Pa. A3 ....4.75
Ind.Harbor,Ind. I-2 ....4.75
Munhall,Pa. U5 ....4.75
So.Chicago,Ill. U5 ....4.75

PLATES, Ingot Iron
Ashland,c.l.(15) A10 ....3.95
Ashland,l.c.l.(15) A10 ....4.45
Cleveland,c.l. R2 ....4.30
Warren,O.c.l. R2 ....4.30

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ....3.70
Aliquippa,Pa. J5 ....3.70
Ashland,Ky.(15) A10 ....3.70
Bessemer,Ala. T2 ....3.70
Clairton,Pa. U5 ....3.70
Claymont,Del. C22 ....4.15
Cleveland J5, R2 ....3.70
Coatesville,Pa. L7 ....4.25
Conshohocken,Pa. A3 ....4.15
Fairfield,Ala. T2 ....3.70
Fontana,Calif. (30) K1 ....4.30
Gary,Ind. U5 ....3.70
GraniteCity,Ill. G4 ....4.40
Geneva,Utah C11 ....3.70
Harrisburg,Pa. C5 ....6.30
Houston,Tex. S5 ....4.10
Ind.Harbor,Ind. I-2, Y1 ....3.70
Johnstown,Pa. B2 ....3.70
Lackawanna,N.Y. B2 ....3.70
Minnequa,Colo. C10 ....4.50
Munhall,Pa. U5 ....3.70
Pittsburgh J5 ....3.70
Seattle B3 ....4.60
Sharon,Pa. S3 ....3.95
So.Chicago,Ill. U5, W14 ....3.70
SparrowsPoint,Md. B2 ....3.70
Steubenville,O. W10 ....3.70
Warren,O. R2 ....3.70
Weirton,W.Va. W6 ....4.00
Youngstown R2, U5, Y1 ....3.70

PLATES, Carbon A.R.
Fontana,Calif. K1 ....5.45
Geneva,Utah C11 ....4.85

PLATES, Wrought Iron
Economy,Pa. B14 ....8.60

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ....3.70
Aliquippa,Pa. J5 ....3.70
Alton,Ill. L1 ....4.15
Atlanta,Ga. A11 ....4.25
Bessemer,Ala. T2 ....3.70
Buffalo R2 ....3.70
Canton,O. R2 ....3.70
Clairton,Pa. U5 ....3.70
Cleveland R2 ....3.70
Detroit R7 ....3.85
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 ....3.70
Fontana,Calif. K1 ....4.40
Gary,Ind. U5 ....3.70
Houston,Tex. S5 ....4.10
Ind.Harbor,Ind. I-2, Y1 ....3.70
Johnstown,Pa. B2 ....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ....3.70
LosAngeles B3 ....4.40
Milton,Pa. B6 ....4.20
Minnequa,Colo. C10 ....4.15
Niles,Calif. P1 ....5.05
N.Tonawanda,N.Y. B11 ....3.70
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 ....3.70
Portland,Oreg. O4 ....4.65
Seattle B3, N14 ....4.45
Struthers,O. Y1 ....3.70
Torrance,Calif. C11 ....4.40
Weirton,W.Va. W6 ....3.85
So.Chicago R2, U5, W14 ....3.70
So.Duquesne,Pa. U5 ....3.70
So.SanFran.,Cal. B3 ....4.45
Youngstown R2, U5 ....3.70

BAR SIZE ANGLES, S. SHAPES
Aliquippa,Pa. J5 ....3.70
Atlanta A11 ....4.25
Johnstown,Pa. B2 ....3.70
Lackawanna,N.Y. B2 ....3.70
Niles,Calif. P1 ....5.05
Portland,Oreg. O4 ....4.65
SanFrancisco S7 ....4.85

BAR SIZE ANGLES; H.R. CARBON
Bethlehem,Pa. B2 ....3.90

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ....4.30
Buffalo R2 ....4.30
Canton,O. R2 ....4.30
Canton,O.(29) T7 ....5.95
Clairton,Pa. U5 ....4.30
Detroit R7 ....4.45
Ecorse,Mich. G5 ....4.65
Fontana,Calif. K1 ....5.35
Gary,Ind. U5 ....4.30
Houston,Tex. S5 ....4.70
Ind.Harbor,Ind. I-2, Y1 ....4.30
Johnstown,Pa. B2 ....4.30
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ....4.30
LosAngeles B3 ....5.35
Massillon,O. R2 ....4.30
Midland,Pa. C18 ....4.30
So.Chicago R2, U5, W14 ....4.30
So.Duquesne,Pa. U5 ....4.30
Struthers,O. Y1 ....4.30
Warren,O. C17 ....4.30
Youngstown U5 ....4.30

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 ....4.55
Gary,Ind. U5 ....4.55
Youngstown U5 ....4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ....5.55
Bessemer,Ala. T2 ....5.55
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.55
Cleveland R2 ....5.55
Fairfield,Ala. T2 ....5.55
Fontana,Calif. K1 ....6.60
Gary,Ind. U5 ....5.55
Ind.Harbor,Ind. I-2 ....5.55
IndianaHarbor,Ind. Y1 ....6.05
Johnstown,Pa. B2 ....5.55
Lackawanna,N.Y. B2 ....5.55
LosAngeles B3 ....6.25
Pittsburgh J5 ....5.55
Seattle B3 ....6.30
So.Duquesne,Pa. U5 ....5.55
So.SanFrancisco B3 ....6.30
Struthers,O. Y1 ....6.05
Youngstown U5 ....5.55

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....4.55
BeaverFalls,Pa. M12,R2 ....4.55
Buffalo B5 ....4.60
Camden,N.J. P13 ....5.00
Carnegie,Pa. C12 ....4.55
Chicago W18 ....4.55
Cleveland A7, C20 ....4.55
Detroit P17 ....4.70
Donora,Pa. A7 ....4.55
Elyria,O. W8 ....4.55
FranklinPark,Ill. N5 ....4.55
Gary,Ind. R2 ....4.55
GreenBay,Wis. F7 ....4.55
Hammond,Ind. L2, M13 ....4.55
Hartford,Conn. R2 ....5.10
Harvey,Ill. B5 ....4.55
LosAngeles R2 ....6.00
Mansfield,Mass. B5 ....5.10
Massillon,O. R2, R8 ....4.55
Monaca,Pa. S17 ....4.55
Newark,N.J. W18 ....5.00
Plymouth,Mich. P5 ....4.80
Pittsburgh J5 ....4.55
Putnam,Conn. W18 ....5.10
Readville,Mass. C14 ....5.10
St.Louis,Mo. M5 ....4.95
So.Chicago,Ill. W14 ....4.55
SpringCity,Pa. (5) K3 ....5.00
Struthers,O. Y1 ....4.55
Waukegan,Ill. A7 ....4.55
Youngstown F3, Y1 ....4.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....5.40
BeaverFalls,Pa. M12 ....5.40
Bethlehem,Pa. B2 ....5.40
Buffalo B5 ....5.40
Camden,N.J. P13 ....5.80
Canton,O. R2 ....5.40
Canton,O.(29) T7 ....4.90
Carnegie,Pa. C12 ....5.40
Chicago W18 ....5.40
Cleveland A7 ....5.45
Cleveland C20 ....5.40
Detroit P17 ....5.55
Donora,Pa. A7 ....5.45
Elyria,O. W8 ....5.40
Gary,Ind. R2 ....5.40
Hammond,Ind. L2, M13 ....5.40
Hartford,Conn. R2 ....5.85
Harvey,Ill. B5 ....5.40
Lackawanna,N.Y. B2 ....5.40
Mansfield,Mass. B5 ....5.85
Massillon,O. R2, R8 ....5.40
Midland,Pa. C18 ....5.40
Monaca,Pa. S17 ....5.40
Newark,N.J. W18 ....5.75
Plymouth,Mich. P5 ....5.60
So.Chicago,Ill. R2, W14 ....5.40
Struthers,O. Y1 ....5.40
Warren,O. C17 ....5.40
Waukegan,Ill. A7 ....5.45
Worcester,Mass. A7 ....5.75
Youngstown F3, Y1 ....5.40

RAIL STEEL BARS
ChicagoHts.(3,4) C2 ....4.75
ChicagoHts.(3,4) I-2 ....4.75
Franklin,Pa. (3,4) F5 ....4.75
FortWorth,Tex.(26) T4 ....4.85
Huntngtn,W.Va.(3) W7 ....5.50
Marion,O.(3) P11 ....4.75
Moline,Ill.(3) R2 ....3.80
Tonawanda (3,4) B12 ....4.75
Williamsport(3) S19 ....5.00
Williamsport(4) S19 ....5.10

BARS, Wrought Iron
Dover,N.J.(Staybolt)U1 ....15.00
Dover,(Eng.Bolt) U1 ....13.50
Dover,(Wrgh.Iron) U1 ....12.25
Economy,Pa. (S.R.)B14 ....9.60
Economy,Pa.(D.R.)B14 ....11.90
Economy,(Staybolt)B14 ....12.20
McK.Rks.(Staybolt)L5 ....14.50
McK.Rks.(S.R.) L5 ....9.60
McK.Rks.(D.R.) L5 ....13.00

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ....3.70
Atlanta A11 ....4.25
Buffalo R2 ....3.70
Cleveland R2 ....3.70
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 ....3.70
Fontana,Calif. K1 ....4.60
Gary,Ind. U5 ....3.70
Houston,Tex. S5 ....4.10
Ind.Harbor,Ind. I-2, Y1 ....3.70
Johnstown,Pa. B2 ....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ....3.70
LosAngeles B3 ....4.40
Milton,Pa. B6 ....4.20
Minnequa,Colo. C10 ....4.20
Munhall,Pa. U5 ....3.70
Niles,Calif. P1 ....5.05
Phoenixville,Pa. P4 ....5.90
Portland,Oreg. O4 ....4.65
Seattle B3 ....4.60
So.Chicago,Ill. R2 ....3.70
So.SanFrancisco B3 ....4.55
SparrowsPoint,Md. B2 ....3.70
Struthers,O. Y1 ....3.70
Torrance,Calif. C11 ....4.40
Youngstown R2, U5 ....3.70

BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 ....5.50
Johnstown, ¾-1" B2 ....4.75
LosAngeles B3 ....5.45
Marion,O. P11 ....5.00
Seattle B3, N14 ....5.55
So.SanFrancisco B3 ....5.45
SparrowsPt. ¾-1" B2 ....4.75
Williamsport,Pa. S19 ....5.10

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity,Ala. R2 ....3.60
Ashland,Ky.(8) A10 ....3.60
Butler,Pa. A10 ....3.60
Cleveland J5, R2 ....3.60
Conshohocken,Pa. A3 ....4.00
Detroit M1 ....4.40
Ecorse,Mich.(8) G5 ....3.80
Fairfield,Ala. T2 ....3.60
Fontana,Calif. K1 ....4.55
Gary,Ind. U5 ....3.60
Geneva,Utah C11 ....3.70
GraniteCity,Ill. G4 ....4.30
Ind.Harbor,Ind. I-2, Y1 ....3.60
Irvin,Pa. U5 ....3.60
Lackawanna,N.Y. B2 ....3.60
Munhall,Pa. U5 ....3.60
Niles,O. N12 ....5.25
Pittsburg,Calif. C11 ....4.30
Pittsburgh J5 ....3.60
Sharon,Pa. S3 ....4.00
So.Chicago,Ill. W14 ....3.60
SparrowsPoint,Md. B2 ....3.60
Steubenville,O. W10 ....3.60
Torrance,Calif. C11 ....4.30
Warren,O. R2 ....3.60
Weirton,W.Va. W6 ....3.60
WestLeechburg,Pa. A4 ....3.75
Youngstown U5, Y1 ....3.60

SHEETS, H.R., (19 gage)
AlabamaCity,Ala. R2 ....4.75
Conneaut,O. R1 ....5.65
Ind.Harbor,Ind. I-2 ....5.40
Mansfield,O. E6 ....5.65
Niles,O. N12 ....5.75
Torrance,Calif. C11 ....5.40

SHEETS, H.R., (14-ga., heavier)
High-Strength Low-Alloy
Cleveland J5, R2 ....5.40
Conshohocken,Pa. A3 ....5.65
Ecorse,Mich. G5 ....5.95
Fairfield,Ala. T2 ....5.40
Fontana,Calif. K1 ....6.35
Gary,Ind. U5 ....5.40
Ind.Harbor,Ind. I-2 ....5.40
IndianaHarbor,Ind. Y1 ....5.90
Irvin,Pa. U5 ....5.40
Lackawanna(35) B2 ....5.40
Pittsburgh J5 ....5.40
Sharon,Pa. S3 ....5.40
So.Chicago,Ill. U5 ....5.40
SparrowsPoint (36) B2 ....5.40
Warren,O. R2 ....5.40
Weirton,W.Va. W6 ....5.75
Youngstown U5 ....5.40
Youngstown Y1 ....5.90

SHEETS, Cold-Rolled
High-Strength Low-Alloy
Cleveland J5, R2 ....6.55
Ecorse,Mich. G5 ....7.10
Fontana,Calif. K1 ....7.50
Gary,Ind. U5 ....6.55
IndianaHarbor,Ind. Y1 ....7.05
IndianaHarbor,Ind. I-2 ....6.55
Irvin,Pa. U5 ....6.55
Lackawanna(37) B2 ....6.55
Pittsburgh J5 ....6.55
SparrowsPoint(38) B2 ....6.55
Warren,O. R2 ....6.55
Weirton,W.Va. W6 ....6.90
Youngstown Y1 ....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.35
Cleveland J5, R2	4.35
Ecorse,Mich. G5	4.55
Fairfield,Ala. T2	4.35
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	5.30
Gary,Ind. U5	4.35
GraniteCity,Ill. G4	5.05
Ind.Harbor,Ind. I-2, Y1	4.35
Irvin,Pa. U5	4.35
Lackawanna,N.Y. B2	4.35
Middletown,O. A10	4.35
Pittsburg,Calif. C11	5.30
Pittsburgh J5	4.35
SparrowsPoint,Md. B2	4.35
Steubenville,O. W10	4.35
Warren,O. R2	4.35
Weirton,W.Va. W6	4.35
Youngstown Y1	4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala. R2	4.80
Ashland,Ky.(8) A10	4.80
Canton,O. R2	4.80
Dover,O. R1	5.50
Fairfield,Ala. T2	4.80
Gary,Ind. U5	4.80
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. I-2	4.80
Irvin,Pa. I5	4.80
Kokomo,Ind.(13) C16	5.20
MartinsFerry,O. W10	4.80
Niles,O. N12	6.00
Pittsburg,Calif. C11	5.55
SparrowsPoint,Md. B2	4.80
Steubenville,O. W10	4.80
Torrance,Calif. C11	5.55
Weirton,W.Va. W6	4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5	7.20
SparrowsPoint(39) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	5.35
Irvin,Pa. U5	5.35
Kokomo,Ind.(13) C16	5.75
Niles,O. N12	6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	5.05
Middletown,O. A10	5.05

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.65
Niles,O. R2 (28)	5.65
Weirton,W.Va. W6	5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.70

SHEETS, Drum Body

Pittsburg,Calif. C11	4.30
Torrance,Calif. C11	4.30

SHEETS, Well Casing

Fontana,Calif. K1	5.10

BLUED Stock, 29 ga.

Yorkville,O. W10	6.80
Follansbee,W.Va.(23) F4	6.85

TIN PLATE, Electrolytic (Base Box)

	0.25-lb	0.50 lb	0.75lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.55
SparrowsPoint,Md. B2	7.25	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R (22 Ga.) COILS (Cut Lengths ½c lower)

	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W10 (cut lengths)			7.25	8.50	9.30
Brackenridge,Pa. A4			7.75	9.00	9.80
GraniteCity,Ill.G4 (cut lengths)			7.95	9.20	
Ind.Harbor,Ind. I-2	6.95	7.25	(34)		
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)		6.75	7.25		
Vandergrift,Pa. U5		7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10		7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35			
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35			
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)

	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)			14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

SHEETS, Enameling Iron

Ashland,Ky.(8) A10	4.65
Cleveland R2	4.65
Gary,Ind. U5	4.65
GraniteCity, Ill. G4	5.35
Ind. Harbor, Ind. I-2	4.65
Irvin,Pa. U5	4.65
Middletown,O. A10	4.65
Youngstown Y1	4.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$6.25
Fairfield,Ala. T2	6.35
Gary,Ind. U5	6.25
GraniteCity,Ill. G4	6.45
Ind.Harbor,Ind. I-2, Y1	6.25
Irvin,Pa. U5	6.25
Niles,O. R2	6.25
Pittsburg,Calif. C11	7.00
SparrowsPoint,Md. B2	6.35
Warren,O. R2	6.25
Weirton,W.Va. W6	6.25
Yorkville,O. W10	6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4	5.85
Gary,Ind. U5	5.85
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. U5	5.85
Yorkville,O. W10	6.15

SHEETS, Culvert No. 16

	Cu Alloy	Cu Fe
Ashland,Ky. A10	5.60	
Canton,O. R2	5.65	6.10
Fairfield,Ala. T2	5.60	5.85
Gary,Ind. U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo,Ind. C16	6.25	
MartinsFy,O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	
SparrowsPt. B2	5.60	
Torrance,Cal. C11	6.35	

SHEETS, Culvert, No. 16 Pure Iron

Ashland,Ky. A10	5.85
Fairfield,Ala. T2	5.85

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.85
Canton,O. R2	4.20
Ind.Harbor,Ind. I-2	3.85
Warren,O. R2	4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	4.95
Middletown,O. A10	4.85
Warren,O. R2	4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10	5.05
Canton,O. R2	5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	5.30
Middletown,O. A10	5.30

SHEETS, ALUMINIZED

Butler,Pa. A10	8.15

TINPLATE, American 1.25 Coke (Base Box)

	lb	lb
Aliquippa,Pa. J5	$8.45	$8.70
Fairfield,Ala. T2	8.55	8.80
Gary,Ind. U5	8.45	8.70
Ind.Har. I-2, Y1	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.Cal. C11	9.20	9.45
Sp.Pt. Md. B2	8.55	8.80
Warren,O. R2	8.45	8.70
Weirton,W.Va. W6	8.45	8.70
Yorkville,O. W10	8.45	8.70

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$7.60
Gary,Ind. U5	7.50
Irvin,Pa. U5	7.50
SparrowsPoint,Md. B2	7.60
Yorkville,O. W10	7.50

SHEETS, LT Coated Ternes, 6 lb

Yorkville,O. W10	$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5	$9.50
Yorkville,O. W10	9.50

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.05
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.60

ROOFING SHORT TERNES (8 lb Coated)

Gary,Ind. U5	9.50

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2	5.30
Conshohocken,Pa. A3	5.55
Ecorse,Mich. G5	5.95
Fairfield,Ala. T2	5.30
Fontana,Calif. K1	6.20
Gary,Ind. U5	5.30
Ind.Harb.,Ind. I-2	5.30
IndianaHarbor,Ind. Y1	5.80
Lackawanna,N.Y. B2	4.95
LosAngeles(23) B3	6.05
Seattle B3	6.30
Sharon,Pa. S3	5.40
So.SanFrancisco(25) B3	6.05
SparrowsPoint,Md. B2	4.95
Warren,O. R2	5.30
Weirton,W.Va. W6	5.75
Youngstown Y1	5.80
Youngstown U5	5.30

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland J5	6.70
Cleveland A7	6.55
Dover,O. G6	7.30
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.40
Sharon,Pa. S3	6.55
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.55
Weirton,W.Va. W6	7.20
Youngstown Y1	7.05

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	3.50
Alton,Ill. L1	3.95
Ashland,Ky.(8) A10	3.50
Atlanta A11	4.05
Bessemer,Ala. T2	3.50
Bridgeprt,Conn.(10) S15	4.00
Buffalo(27) R2	3.50
Butler,Pa. A10	3.50
Carnegie,Pa. S18	4.00
Conshohocken,Pa. A3	3.90
Detroit M1	4.40
Ecorse,Mich. G5	3.80
Fairfield,Ala. T2	3.50
Fontana,Calif. K1	4.75
Gary,Ind. U5	3.50
Houston,Tex. S5	3.90
Ind. Harbor,Ind. I-2, Y1	3.50
Johnstown,Pa.(25) B2	3.50
KansasCity,Mo.(9) S5	4.10
Lackawanna,N.Y.(32) B2	3.50
LosAngeles B3	4.25
Milton,Pa. B6	4.00
Minnequa,Colo. C10	4.55
NewBritain(10) S15	4.00
No.Tonawanda,N.Y. B11	3.50
Pittsburg,Calif. C11	4.25
Riverdale,Ill. A1	3.50
SanFrancisco S7	4.85
Seattle B3, N14	4.50
Sharon,Pa. S3	4.00
So.Chicago,Ill. W14	3.50
So.SanFrancisco B3	4.25
SparrowsPoint,Md. B2	3.50
Torrance,Calif. C11	4.25
Warren,O. R2	3.50
Weirton,W.Va. W6	3.60
WestLeechburg,Pa. A4	3.75
Youngstown U5, Y1	3.50

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10)	S15 5.45
Carnegie,Pa. S18	5.85
Fontana,Calif. K1	6.70
Gary,Ind. U5	5.50
Houston,Tex. S5	5.90
KansasCity,Mo. S5	6.10

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Beres,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10)	S15 5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	....
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.05	7.65	...	....
Detroit D2	5.60	6.65	7.25	...	....
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
FranklinPark,Ill. T6	5.90	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Conn.(10)	S15 5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	....
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	....
NewYork W3	...	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. N8; Cleve.orPitts Base	...	6.80	7.40	9.35	11.65
Worcester,Mass.,Base.	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65

Spring Steel (Tempered)

Trenton,N.J. R5	...	10.30	12.50	15.35
Harrison,N.J. C18	...	10.30	12.50	15.35
NewYork W3	...	10.30	12.50	15.35

Midland,Pa. C18	5.85
NewBritn,Conn.(10)	S15 5.45
Sharon,Pa. S3	5.85
Youngstown U5	5.50

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	5.50
Beres,O. C7	6.60
Bridgeprt,Conn.(10)	S15 5.35
Butler,Pa. A10	4.65
Cleveland A7, J5	4.65
Dearborn,Mich. D3	5.60
Detroit D2	5.60
Detroit M1	5.45
Dover,O.(40) G6	5.50
Ecorse,Mich. G5	4.85
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	6.30
FranklinPark,Ill.(40)	T6 4.90
Ind.Harbor,Ind. I-2	4.90
Lackawanna,N.Y. B2	4.65
LosAngeles C1	6.40
Mattapan,Mass. T6	5.50
Middletown,O. A10	4.65
NewBritain(10) S15	5.35
NewCastle,Pa. B4	5.35
NewCastle,Pa.(40)	E5 5.25
NewHaven,Conn. D2	5.85
NewHaven,Conn. A7	5.15
Pawtucket,R.I. R3	6.00
Pawtucket,R.I.(21)	N8, 5.85
Riverdale,Ill.(40)	A1 4.90
Rome,N.Y. R6	5.10
Sharon,Pa. S3	5.35
SparrowsPoint,Md. B2	4.65
Trenton,N.J. R5	6.00
Wallingford,Conn. W2	5.85
Warren,O.(40) T5	5.25
Warren,O. R2	4.65
Weirton,W.Va. W6	4.65
Youngstown C8 (40)	5.25
Youngstown Y1	4.65

STRIP, Electro Galvanized

Dover,O. G6	5.50
Warren,O. T5	5.25
Weirton,W.Va. W6	4.65
Youngstown C8	5.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co
B5 Bliss & Laughlin Inc.
B6 Boardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Corp.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Frez-Moon Tube Co.
F7 Ft. Howard Steel & Wire
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
I-1 Igoe Bros., Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div. Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Cold-Rolled Alloy Steel

Bridgeport,Conn. (10)	$15	10.75
Carnegie,Pa.	S18	10.60
Cleveland A7		10.00
Dover,O. G6		10.50
Fontana,Calif. K1		11.65
Harrison,N.J. C18		10.60
Midland,Pa. C18		10.60
New Britn,Conn. (10)	$15	10.75
Pawtucket,R.I. (11)	N8	10.75
Pawtucket,R.I. (12)	N8	11.05
Sharon,Pa. S3		10.60
Worcester,Mass. A7		11.85
Youngstown C8		10.60

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky. (8) A10	3.75
Warren,O. R2	4.10

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	5.25

TIGHT COOPERAGE HOOP

Atlanta A11	4.05
Riverdale,Ill. A1	3.90
Sharon,Pa. S3	4.15
Youngstown U5	3.75

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
AlabamaCity	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19) K4	5.70	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville M8	5.95	6.40
Donora,Pa. A7	5.70	6.15
Duluth,Minn. A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
KansasCy,Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa,Colo. C10	5.95	4.45
Monessen P7	5.95	6.40
Palmer W12	5.15	...
Pittsburg,Calif. C11	6.65	6.80
Prtsmth.(18) P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
SparrowsPt. B2	5.80	6.25
Sterling,Ill.(1) N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

ROPE WIRE

	(A)	(B)
Alton,Ill. L1	8.65	8.90
Bartonville,Ill. K4	8.55	8.80
Buffalo W12	8.55	8.80
Fostoria,O. S1	8.85	9.10
Johnstown,Pa. B2	8.55	8.80
Monessen,Pa. P16	8.55	8.80
Monessen,Pa. P7	8.80	9.05
Palmer,Mass. W12	8.85	9.10
Portsmouth,O. P12	8.55	8.80
Roebling,N.J. R5	8.85	9.10
SparrowsPt. B2	8.65	8.90
Struthers,O. Y1	8.55	8.80
Worcester J4, T6	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	4.85
Aliquippa,Pa. J5	4.85
Atlanta A11	5.10
Bartonville,Ill. (1) K4	5.00
Buffalo W12	4.85
Chicago W13	5.10
Cleveland A7, C20	4.85
Crawfordsville,Ind. M8	5.10
Donora,Pa. A7	4.85
Duluth,Minn. A7	4.85
Fairfield,Ala. T2	4.85
Fostoria,O.(24) S1	5.35
Houston S5	5.25
Johnstown,Pa. B2	4.85
Joliet,Ill. A7	4.85
KansasCity,Mo. S5	5.45
Kokomo,Ind. C16	4.95
LosAngeles B3	5.80
Minnequa,Colo. C10	5.10
Monessen,Pa. P7	5.10
Newark, 6-8 ga. I-1	5.50
No.Tonawanda B11	4.85
Palmer,Mass. W12	5.15
Pittsburg,Calif. C11	5.80
Portsmouth,O. P12	5.25
Rankin,Pa. A7	4.85
So.Chicago,Ill. R2	4.85
So.SanFrancisco C10	5.80
SparrowsPoint,Md. B2	4.85
Sterling,Ill.(1) N15	5.15
Struthers,O. Y1	4.85
Torrance,Calif. C11	5.80
Waukegan,Ill. A7	4.85
Worcester,Mass. A7, T6	5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	6.20
Buffalo W12	6.35
Cleveland A7	6.20
Crawfordsville,Ind. M8	6.20
Detroit D2	6.20
Dover,O. G6	6.20
Fostoria,O. S1	6.00
Kokomo,Ind. C16	5.70
FranklinPark,Ill. T6	6.20
Massillon,O. R8	6.50
Monessen,Pa. P16	5.85
Monessen,Pa. P7	6.10
NewHaven,Conn. D2	6.50
Pawtucket,R.I.(12) N8	6.85
Trenton,N.J. R5	6.15
Worcester,Mass. A7	6.15
Worcester,Mass. T6	6.50
Worcester,Mass. W12	6.65

WIRE, Galv'd ACSR for Cores

Bartonville,Ill. K4	8.50
Monessen,Pa. P16	8.50
Roebling,N.J. R5	8.80
SparrowsPoint,Md. B2	8.60
Johnstown,Pa. B2	8.50

WIRE, Tire Bead

Bartonville,Ill. (1) K4	10.90
Monessen,Pa. P16	11.40
Roebling,N.J. R5	11.55

	An'ld Stone	Galv. Stone
WIRE (16 gage)		
Aliquippa J5	10.15	12.15
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfordsville M8	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.25	12.15
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass. W12	10.25	12.15
Pitts.Cal. C11	10.60	12.50
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.35	12.25
Waukegan A7	10.25	12.15

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	6.25
Alton,Ill. L1	6.45
Bartonville,Ill.(1) K4	6.25
Buffalo W12	6.25
Cleveland A7	6.25
Donora,Pa. A7	6.25
Duluth,Minn. A7	6.25
Fostoria,O. S1	6.25
Johnstown,Pa. B2	6.25
LosAngeles B3	7.20
Milbury,Mass.(12) N6	8.05
Monessen,Pa. P7, P16	6.25
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Roebling,N.J. R5	6.55
Portsmouth,O. P12	6.25
So.Chicago,Ill. R2	6.25
So.SanFrancisco C10	7.20
SparrowsPoint,Md. B2	6.35
Struthers,O. Y1	6.25
Trenton,N.J. A7	6.55
Waukegan,Ill. A7	6.25
Worcester A7, T6, W12	6.55
Worcester,Mass. J4	6.75

WIRE, Fine & Weaving(8" Coils)

Bartonville,Ill.(1) K4	8.90
Buffalo W12	8.90
Chicago W13	8.90
Cleveland A7	8.90
Crawfordsville,Ind. M8	8.95
Fostoria,O. S1	8.90
Johnstown,Pa. B2	8.90
Kokomo,Ind. C16	8.90
Monessen,Pa. P16	8.90
Palmer,Mass. W12	9.20
Portsmouth,O. P12	8.90
Roebling,N.J. R5	9.20
Waukegan,Ill. A7	8.90
Worcester,Mass. A7 T6	9.20

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	137
Aliquippa,Pa. J5	141
Atlanta A11	144
Bartonville,Ill.(19) K4	144
Crawfordsville,Ind. M8	146
Donora,Pa. A7	141
Duluth,Minn. A7	141
Fairfield,Ala. T2	141
Houston,Tex. S5	149
Johnstown,Pa. B2	141
Joliet,Ill. A7	141
KansasCity,Mo. S5	153
Kokomo,Ind. C16	143
Minnequa,Colo. C10	147
Monessen,Pa. P7	146
Pittsburg,Calif. C11	161
Portsmouth,O.(18) P12	148
Rankin,Pa. A7	141
So.Chicago,Ill. R2	137
So.SanFran.,Calif. C10	161
SparrowsPoint,Md. B2	143
Sterling,Ill.(1) N15	141

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Crawfordsville,Ind. M8	132
Donora,Pa. A7	123
Duluth,Minn. A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.90
Alton,Ill. L1	6.10
Buffalo W12	5.90
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth,Minn. A7	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Monessen,Pa. P7, P16	5.90
NewHaven,Conn. A7	6.20
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
So.SanFrancisco C10	6.85
SparrowsPoint,Md. B2	6.00
Torrance,Calif. C11	6.85
Trenton,N.J. A7	6.20
Waukegan,Ill. A7	5.90
Worcester,Mass. A7	6.20

WOVEN FENCE, 9-15½ Ga.	Col.
AlabamaCity,Ala. R2	127
Ala.City,Ala.,17-18ga. R2	214
Aliquippa,Pa. 9-14½ga. J5	131
Atlanta A11	134
Bartonville,Ill.(19) K4	131
Crawfordsville,Ind. M8	133
Donora,Pa. A7	131
Duluth,Minn. A7	131
Fairfield,Ala. T2	131
Houston,Tex. S5	139
Johnstown,Pa. B2	131
Johnstown,17ga.,6" B2	205
Johnstown,17ga.4" B2	208
Joliet,Ill. A7	131
KansasCity,Mo. S5	143
Kokomo,Ind. C16	133
Minnequa,Colo. C10	139
Monessen,Pa. P7	136
Pittsburg,Calif. C11	154
Portsmouth,O.(18) P12	138
Rankin,Pa. A7	131
So.Chicago,Ill. R2	127
Sterling,Ill. (1) N15	131

FENCE POSTS	
ChicagoHts.,Ill. C2	140
Duluth,Minn. A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	140
Johnstown,Pa. B2	140
Marion,O. P11	140
Minnequa,Colo. C10	130
Moline,Ill. R2	136
So.Chicago,Ill. R2	140
Tonawanda,N.Y. B12	140
Williamsport,Pa. S19	150

TRACK BOLTS (20) Treated	
KansasCity,Mo. S5	9.85
Lebanon,Pa.(31) B2	9.85
Minnequa,Colo. C10	9.85
Pittsburgh O3, P14	9.85
Seattle B3	10.35

RAILS	Std. No. 1	Std. No. 2	Std. All	Std. Tee Rails 60 lb and Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala. T2	...	...	...	4.00
Gary,Ind. U5	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	...(16)	4.06
Lackawanna,N.Y. B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williamsport,Pa. S19	...	...	...	4.75

NAILS & STAPLES, Stock

To dealers & mfrs. (7)	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa.(13) J5	118
Atlanta A11	118
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	118
Cleveland A9	125
Crawfordsville,Ind. M8	122
Donora,Pa. A7	118
Duluth,Minn. A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S6	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill. (1) N15	118
Torrance,Calif. C11	138
Worcester,Mass. A7	124

NAILS, Cut (100 lb keg)

To dealers (33)	
Conshohocken,Pa. A3	$7.35
Wheeling,W.Va. 10	7.35

TIE PLATES	
Fairfield,Ala. T2	4.50
Gary,Ind. U5	4.50
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.50
Minnequa,Colo. C10	4.50
Steelton,Pa. B2	4.50
Torrance,Calif. C11	4.65

JOINT BARS	
Bessemer,Pa. U5	4.70
Fairfield,Ala. T2	4.70
Ind.Harbor,Ind. I-2	4.70
Joliet,Ill. U5	4.70
Lackawanna,N.Y. B2	4.70
Minnequa,Colo. C10	4.70
Steelton,Pa. B2	4.70

STANDARD TRACK SPIKES	
Ind.Harbor,Ind. I-2, Y1	6.15
KansasCity,Mo. S5	6.40
Lebanon,Pa. B2	6.15
Minnequa,Colo. C10	6.15
Pittsburgh J5	6.15
Seattle B3	6.65
So.Chicago,Ill. R2	6.15
Struthers,O. Y1	6.15
Youngstown R2	6.15

AXLES	
Ind.Harbor,Ind. S13	5.60
Johnstown,Pa. B2	5.60

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.
N2 National Supply Co.
N3 National Tube Div.
N5 Nelsen Steel & Wire Co.
N6 NewEng-HighCarb. Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Div.
N14 Nrthwst.Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhodes-Lund Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RellianceDiv.,Eaton Mfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
T2 Tenn. Coal & Iron Div.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.
V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W.Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 YoungstownSheet&Tube

TOOL STEEL

Grade	$ per lb
Regular Carbon	0.230
Extra Carbon	0.270
Special Carbon	0.325
Oil Hardening	0.350
5% Cr Hot Work	0.350
Hi-Carbon-Cr	0.635

Grade by Analysis

W	Cr	V	Co	
18	4	1	...	1.505
18	4	2	...	1.650
20	25 4.25	1.6	12	20 3.535-3.675
19	4	2	7	2.460
18	25 4.25	1	4.75	2.125
18	4	2	9	2.445-2.45
13.5	4	3	...	1.6025

W	Cr	V	Mo	
6.4	4.5	1.9	5	0.96-0.965
6	4	3	6	1.190
1.5	4	1	8.5	0.810

Tool steel producers include: A4, A5, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2 and V3.

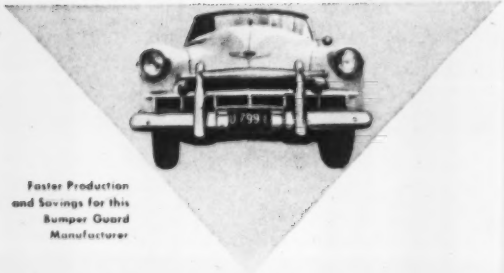
Footnotes:

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga. & heavier.
(14) Also wide flange beams.
(15) ⅝" and thinner.
(16) ½" and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25c off for untreated.
(21) New Haven, Conn. base.
(22) Del. San Francisco Bay area.
(23) 28 Ga. 16" wide.
(24) Deduct 0.20c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, mill lengths, to fabricators; to consumers, 5.60c.
(27) Bar mill stock.
(28) Rondelized.
(29) Subject to 10% increase.
(30) Sheared: add 0.35c for universal mill.
(31) Not annealed.
(32) Rd. or square edge.
(33) To jobbers, deduct 20c.
(34) 7.25c for cut lengths.
(35) 12" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter: 60" & narrower.
(38) 14 gage & lighter: 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.

how to get

more *than just steel for your money*

***edge rolling** could be the answer to production savings in your plant!*



Faster Production and Savings for this Bumper Guard Manufacturer

Safety and Savings for this Baby Carriage Manufacturer

Better Design and Savings for this Electric Fan Manufacturer

Most certainly we can give you any kind of an edge your production requires,—rounded, deburred or special,—on hot rolled, hot rolled bars, hot rolled pickled, cold rolled strip and on cold drawn flats.

Know what this could mean? We can show you how our edge rolling can eliminate steps in your own manufacturing and save you money!

Yes, when you buy Sure Spec steel from us, you not only get the benefit of our edge rolling money saving service, but you can order any finish and any temper from our large stocks. And you get it at the *right price*, with *any delivery* you specify, and it's *properly packaged*, too.

In these days of rising manufacturing costs, it will pay you to call us for more information on edge rolling. Do this today, and one of our Sure Spec sales engineers will give you free information and advice on this money saving service.

PRODUCTS WAREHOUSED

Sheet and Strip HR, HRP, CR • Cold Finished Bars & Hot Rolled Bars, both carbon & alloy Plates • Galvanized, Long Ternes and Tin Mill Products • Seamless Tubing • Drill Rod

SERVICES

Shearing • Slitting • Cutting • Flattening Edge rolling • Pickling • Oiling • Packaging

SPECIAL OFFERINGS

Write and we will mail them

"for service dependable as the sun"

SOLAR STEEL CORPORATION

See your local classified telephone directory for our nearest office address

SURE SPEC — General Offices: UNION COMMERCE BUILDING, CLEVELAND, OHIO

PLANTS — Chicago • Cincinnati • Cleveland • Detroit • Philadelphia • Union, N. J.

SALES OFFICES — Chicago • Cincinnati • Cleveland • Detroit • Grand Rapids • Kalamazoo • New Haven • Philadelphia • Rochester, N.Y. • Toledo • Union, N. J.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % —Black— A	B	C	—Galvanized— D	E	F
¼	5.5c	0.24	34.0	32.0	...	+0.5	+2.5	...
⅜	6.0	0.42	28.5	26.5	...	+3.5	+5.5	...
½	6.0	0.57	23.5	21.5	...	+10.0	+12.0	...
⅝	8.5	0.85	36.0	34.0	35.0	12.0	10.0	11.0
¾	11.5	1.18	39.0	37.0	38.0	16.0	14.0	15.0
1	17.0	1.68	41.5	39.5	40.5	19.5	17.5	18.5
1¼	23.0	2.28	42.0	44.0	41.0	20.5	22.5	19.5
1½	27.5	2.78	42.5	41.5	41.5	21.5	20.0	20.5
2	37	3.68	43.0	41.0	42.0	22.0	20.0	21.0
2½	58.5	5.82	43.5	41.5	42.5	23.0	21.0	22.0
3	76.5	7.62	43.5	41.5	42.5	23.0	21.0	22.0

Column A: Etna, Pa. N2 and 36⅛% on 3½", 4"; Butler, Pa. ⅜-⅝", F6; Benwood, W. Va., 3½ points lower on ⅜", 1½ points lower on ½", and 2 points lower on ⅝". W10; Sharon, Pa. M6, 1 point higher on ⅜", 2 points lower on ½" and ⅝". Wheatland, Pa. W9, 2 points lower on ⅜", ½", ⅝"; Following make ⅜" and larger: Lorain, O., N3; Youngstown R2 and 36⅛% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5; Fontana, Calif. K1 quotes 11½ points lower on ⅜" and larger continuous weld and 24% on 3½" and 4".

Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., Y1; Alton, Ill., (Gary base) 2 points lower discount L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 4% on ⅜", plus 6% on ½", plus 13% on ⅝" and 15.5% on 3½", 4"; Sharon, Pa. M6, plus 2.5 on ⅛", 1 point lower on ¼", ⅜", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Wheatland, Pa. W9, add 2 points on ¼", ½", ⅝", 1 point lower on ⅜", 2 points lower on 1", 1¼", 2", 2½" and 3". Following quote only on ⅛" and larger: Lorain, O. N3; Youngstown R2, and 15½% on 3½" and 4"; Youngstown Y1, Aliquippa, Pa. J5 quotes 1 point lower on ⅜", 2 points lower on 1", 1½", 2", 1½ points lower on 1¼", 2½" and 3".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Galv. B	Elec. Weld Black C	Galv. D
2	37.0c	5.68	29.5	8.0	29.5	8.0
2½	58.5	5.82	32.5	11.5	32.5	11.5
3	76.5	7.62	32.5	11.5	32.5	11.5
3½	92.0	9.20	34.5	13.5	34.5	13.5
4	$1.09	10.89	34.5	13.5	34.5	13.5
5	1.48	14.81	37.0	16.0	37.0	16.0
6	1.92	19.18	37.0	16.0	37.0	16.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	—Seamless— H.R.	C.D.	Elec. Weld H.R.	C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1¾	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	12	24.35	29.82	24.50	28.84
2¼	12	26.92	32.97	26.98	31.76
2½	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	—Plates— Carbon Base 10%	20%	—Strip— Cold-Rolled Carbon Base 10%	Both Sides	—Sheets— Carbon Base 10%	20%	Cu Base Both Sides
302	....	....	....	....	19.75	26.24-27.50	77.00
304	25.00	29.50	....	....	24.50	27.50-27.77	77.00
309	30.50	35.00	....	....	....	....	....
310	36.50	41.00	....	....	....	....	144.00
316	29.50	34.00	....	....	26.00	35.92-36.50	....
317	34.50	39.00	....	....	....	....	....
318	33.50	38.00	....	....	....	....	....
321	26.50	31.00-32.00	....	....	23.00	33.00	111.00
347	27.50	32.00	....	....	24.00	33.50-33.83	130.00
405	21.25	27.75	....	....	....	....	....
410	20.75	27.25	....	....	....	....	....
Nickel	33.55	45.15	41.00	54.00	....	....	....
Inconel	41.23	54.18	....	....	....	....	165.00
Monel	34.93	46.28	....	....	....	....	....
Copper*	....	....	23.70†	29.65‡	....	....	....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. 1-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; nickel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:	
½-in. & smaller diam.	15
⅝-in. & ¾-in.	18.5
⅞-in. and larger	17.5
Longer than 6 in.:	
All diams.	14
Lag bolts, all diams.:	
6 in. and shorter	23
over 6 in. long	21
Ribbed Necked Carriage	18.5
Blank	34
Plow	34
Step, Elevator, Tap and Sleigh Shoe	21
Tire bolts	Lt
Boiler & Fitting-Up bolts	31

NUTS

H.P. & C.P. Square:	Reg. Hvy.
½-in. & smaller	15 15
⅝-in. & ¾-in.	12 6.5
⅞-in.-1½-in.	9 1
1⅝-in. & larger	7.5 1
H.P. Hex.:	
½-in. & smaller	26 22
⅝-in. & ¾-in.	16.5 6.5
⅞-in.-1½-in.	12 2
1⅝-in. & larger	8.5 2
C.P. Hex.:	
½-in. & smaller	26 22
⅝-in. & 1-in.	23 17.5
1⅛-in. & 1½-in.	19.5 12
1⅝-in. & larger	12 6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Reg. Hvy.
½-in. & smaller	33 28.5
⅝-in. & ¾-in.	29.5 22
⅞-in.-1½-in.	24 15
1⅝-in. & larger	13 8.5
	Light
⅞-in. & smaller	35 28.5
1-in. to ⅜-in.	28.5 26
⅝-in. to 1½-in.	26

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish	48 & 10
Plated finishes	31 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:	
⅝-in. & smaller	42
¾-in. through 1 in.	34
Longer than 6 in.:	
⅝-in. & smaller	26
¾-in. through 1 in.	4

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter	38
1 in. and smaller diam. x over 6 in.	26

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller	35
¼-in. diam. & larger	16
N.F. thread, all diams.	10

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger 7.85c

⅞-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers List to list-plus-$1.

FLUORSPAR

Metallurgical grade, f. o. b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70%, $43; 60%, $40.

Imported, net ton, duty paid, metallurgical grade, $33-$35.

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Diam. —Inches—	Length	Cents per lb
17,18,20	60,72	17.85
8 to 16	48,60,72	17.85
7	48,60	19.57
6	48,60	20.95

CARBON

35,40	110	8.03
30	65,84,110	8.03
24	72 to 104	8.03
17 to 20	34,90	8.03

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	41.00	34.00	31.25
302	41.25	36.75	31.50
303	43.25	40.25	34.00
304	43.25	38.75	33.00
309	56.00	55.00	44.75
316	57.00	59.00	49.25
321	49.25	48.25	37.00
347	53.75	52.25	41.50
410	36.50	30.50	25.75
416	37.00	37.00	26.25
420	44.00	47.00	31.25
430	39.00	31.00	26.25
501	27.50	26.00	14.25
502	28.50	27.00	13.25

Balt., Types 301-347 sheet, except 303 and 309 K2.

Brackenridge, Pa., Sheets A4 quotes slight variations on Types 301-347.

Bridgeville, Pa., bars, wire, sheets & strip U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502, A10.

Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502 and 0.25c lower on Types 302, 304, 321, 347; 0.50c lower on Types 309 and 316 S18.

Cleveland, strip A7.

Detroit, strip M1 quotes 34.00c on Type 301; 36.50c, 302; 38.50c, 304; 58.50c, 316; 52.00c, 347; 30.50c, 410; 31.00c, 430.

Dunkirk, N. Y., bars, wire A4 quotes slight variations on Types 301-347.

Duquesne, Pa., bars U5.

Fort Wayne, Ind., bars and wire, except Types 501 & 502 J6 quotes slight variations on Types 301-347.

Gary, Ind., sheets except Type 416 U5.

Harrison, N. J., strip and wire C18.

Massillon, O., all items, R2.

McKeesport, Pa., strip, Type 410; bars & wire, Types 410 through 430 and 31.25c on Type 302, 33.75c on 303, 32.75c on 304, 48.75c on 316, 36.75c on 321, 41.25c on 347 F2.

McKeesport, Pa., bars, sheets except Type 416 U5.

Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars U5.

Pittsburgh, sheets C18.

Reading, Pa., strip except 34.25c on Type 301 and 36.00c on 309; bars, except 31.50c on Type 301 and 45.25c on 309 C4.

Sharon, Pa., strip, except Types 303, 309, 416, 501, 502 and 34.25c on Type 301 S3.

So. Chicago, Ill., bars & structurals U5.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars, U4.

Wallingford, Conn., strip W2 quotes 0.25c higher.

Washington, Pa., bars, sheets & strip, except 0.25c higher on Type 301 J3.

Washington, Pa., Types 301 through 347 sheets & strip except 303, 309; 316 sheets 62.00c, strip 64.00c W4.

Watervliet, N. Y., structurals & bars A4 quotes variations on Types 301-347.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, A4 quotes slight variations on Types 301-347.

Youngstown, strip except Types 303, 309, 316, 416, 501 and 502 and 34.25c on Type 301.

COAL CHEMICALS

Spot, cents per gallon, ovens

Pure benzol ... 30.00-35.00

Toluol, one deg. 26.00-33.00

Industrial xylol, 25.00-33.50

Per ton bulk, ovens

Sulphate of ammonia $32-$45

Cents per pound, ovens

Phenol, 40 (carlots, non-returnable drums) ..17.25

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

Sponge iron	Cents
98+% Fe, carlots	17.00
Swedish, c.i.f. New York, in bags	8.85-9.95
Electrolytic Iron:	
Annealed, 99.5% Fe	42.50
Unannealed, 99 + % Fe	36.50
Unannealed, 99 + % Fe (minus 325 mesh)	58.50
Powder Flakes	48.50
Carbonyl Iron:	
97.9-99.8%, size 5 to 10 microns	83.00-148.00
Aluminum:	
Carlots, freight allowed	29.50
Atomized, 500 lb drums, freight allowed	33.50
Antimony	75.85
Brass, 10-ton lots	30.00-33.25
Bronze, 10-ton lots	51.25-60.00
Phosphor-Copper, 10 ton lots	50.00
Copper:	
Electrolytic	37.25-46.25
Reduced	33.75-37.00
Lead	25.50
Magnesium	75.00-85.00
Manganese:	
Minus 100-mesh	57.00
Minus 35-mesh	52.00
Minus 200 mesh	62.00
Nickel unannealed	86.00
Nickel-Silver, 10-ton lots	45.00
Silicon	38.50
Solder (plus cost of metal)	8.50
Stainless Steel, 302	83.00
Zinc, 10-ton lots	23.00-30.50
Tungsten	Dollars
Melting grade, 99%, 60 to 200 mesh, freight allowed:	
1000 lb and over	6.00
Less than 1000 lb	6.15
98.8% minus 65 mesh, freight allowed:	
1000 lb and over	4.15
Less than 1000 lb	4.25
Molybdenum:	
99.9%, minus 200 mesh	3.25
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvill fur.	$14.50-15.00
Connellsvill fdry	17.00-18.00
New River foundry	21.30
Wise county, foundry	15.95
Wise county, furnace	15.20

OVEN FOUNDRY COKE

Kearny, N. J., ovens	$22.75
Everett, Mass., ovens	
New England, del.	*24.80
Chicago ovens	23.00
Chicago, del.	24.50
Terre Haute, ovens	22.50
Milwaukee, ovens	23.75
Indianapolis, ovens	22.75
Chicago, del.	26.42
Cincinnati, del.	25.85
Detroit, del.	26.85
Ironton, O., ovens	22.50
Cincinnati, del.	25.12
Painesville, O., ovens	24.00
Cleveland, del.	25.82
Erie, Pa., ovens	23.50
Birmingham, ovens	20.50
Birmingham, del.	21.60
Philadelphia, ovens	22.70
Nevillelsland Pa.,ovens	23.00
Swedeland, Pa., ovens	22.60
St. Louis, ovens	
St. Louis, del.	25.40
Portsmouth, O., ovens	22.50
Cincinnati, del.	25.12
Detroit, ovens	24.00
Detroit, del.	25.00
Buffalo, del.	26.89
Flint, del.	26.59
Pontiac, del.	25.47
Saginaw, del.	26.92

* Or within $4.15 freight zone from works.

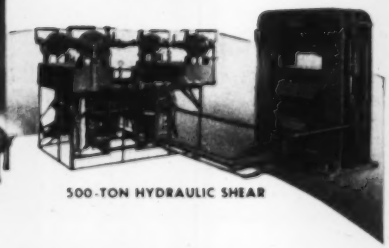
STEEL MILL EQUIPMENT

Precision built

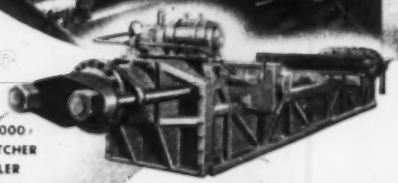
BY

Y&T

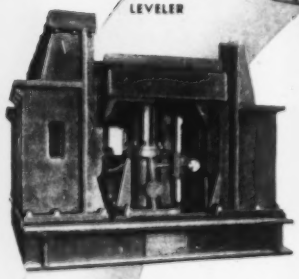
100" SCRUBBER LINE



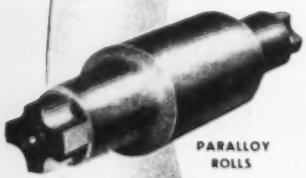
500-TON HYDRAULIC SHEAR



800,000 STRETCHER LEVELER



SLAB PILER



PARALLOY ROLLS

Check this List for the Products You Need

- PARALLOY ROLLS (Pinch, Coiler, Tension, Steel Mill)
- HYDRAULIC SLAB AND BILLET PILERS
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- HOT SAWS—ROCKING AND SLIDE TYPES
- HOT BEDS—COOLING BEDS—TRANSFERS
- BILLET EJECTORS—PINCH ROLL STANDS
- SLITTERS—SPECIAL SHEARS AND GAUGES
- TILTING TABLES—Traveling and Lifting Tables
- Continuous PICKLING Lines—ROLLER LEVELERS
- FURNACE Charging Equipment—Furnace Pushers
- Strip Steel COILERS and REELS—SCRAP BALLERS
- RAILROAD Spike Forming Machines—ROLL LATHES
- Sheet GALVANIZING Lines—Wire Patenting Frames
- Stretcher Levelers—Angle and Shape Straighteners
- Rolling Mill Tables—Gear and Individual Motor Types
- DUCTILE CASTINGS (80,000 PSI.)

Machinery Built to Customer's Design and Detail Drawings

The Youngstown Foundry & Machine Co.

OVER SIXTY YEARS OF SERVICE TO THE STEEL INDUSTRY

Youngstown, Ohio

WAREHOUSE STEEL PRODUCTS

(Representative prices, cents per pound, for delivery within switching limits, subject to extras.)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140‡		Carbon	Floor
New York (city)	6.54	7.21	8.55	7.05	...	6.62	7.53	9.28	6.37	6.71	7.98
JerseyCity(c'try)	6.24	6.91	8.25	6.75	...	6.32	7.23	8.98	6.07	6.41	7.68
Boston (city)	6.40	7.18	8.63	6.35	...	6.25	7.04	9.00	6.40	6.86	7.84
Boston (c'try)	6.20	6.98	8.43	6.15	...	6.05	6.84	9.20	6.20	6.66	7.64
Phila. (city)	6.97	7.06	8.38	6.33	7.11	6.30	7.16	8.92	6.13	6.34	7.40
Phila. (c'try)	6.72	6.80	8.13	6.08	6.86	6.05	6.91	8.67	5.88	6.09	7.15
Balt. (city)	6.22	7.00	8.40	6.23	...	6.21	6.83	...	6.33	6.33	7.57
Balt. (c'try)	6.02	6.80	8.20	6.03	...	6.01	6.63	...	6.13	6.13	7.37
Norfolk, Va.	6.78	...	...	...	...	6.00	7.20	...	6.30	6.30	7.15
Richmond, Va.	5.95	6.57	8.10	6.14	...	5.91	6.59	...	6.22	6.86	7.47
Wash. (w'hse)	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.)	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††§	6.00	6.25	7.55
Buffalo (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††§	5.80	6.05	7.35
Pitts. (w'hse)	5.50	6.32	7.85	5.59	6.90	5.45	6.20	10.30††	5.65	5.65	6.89
Detroit (w'hse)	5.75	6.47	8.12	5.76	7.15	5.76	6.64	9.13	6.09	5.88	7.21
Cleveland (del.)	5.74	6.52	8.16	5.85	7.18	5.77	6.60	8.91	6.15	6.15	7.39
Cleve. (w'hse)	5.54	6.32	7.96	5.65	6.98	5.57	6.40	8.71	5.95	5.95	7.19
Cincin. (city)	5.99**	6.53	8.44	6.15	...	5.90	6.79	...	6.24	6.29	7.43
Chicago (city)	5.76	6.55	8.08	5.77	...	5.67	6.50	10.50††	5.88	5.90	7.09
Chicago (w'hse)	5.56	6.35	7.88	5.57	...	5.47	6.30	10.30††	5.68	5.70	6.89
Milwau. (city)	5.90	6.76	8.21	5.85	...	5.83	6.76	10.85††	6.01	6.06	7.25
Milwau. (c'try)	5.70	6.56	8.01	5.65	...	5.63	6.56	10.65††	5.81	5.86	7.05
St. Louis (del.)	6.05	6.85	8.20	6.00	...	6.00	6.85	10.55	6.23	6.33	7.53
St. L. (w'hse)	5.85	6.65	8.00	5.80	...	5.80	6.65	10.35	6.03	6.13	7.33
Kans. City(city)	6.40	7.20	8.40	6.35	...	6.35	7.20	....	6.50	6.60	7.80
KansCity(w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	....	6.30	6.40	7.60
Birm'hm (city)	5.75	6.55	6.90‡	5.70	...	5.70	7.53	....	5.85	6.10	8.25
Birm'hm(w'hse)	5.60	6.40	6.75‡	5.55	...	5.55	7.53	....	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05‡	6.60	8.90	6.55	7.75	....	6.55	6.60	9.20
L. A. (w'hse)	6.35	7.90	8.85‡	6.40	8.70	6.35	7.55	....	6.35	6.40	8.70
Seattle-Tacoma	7.04	8.96	9.65	7.04	...	6.79	8.80	10.35	6.54	6.78	8.73
San Francisco	7.05	8.60‡	9.20‡	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); ‡ includes extra for 10 gage; § as rolled; ** 16 gage; †† as annealed; §§ 15 gage. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; ‡—300 to 1499 lb; §—450 to 1499 lb; ¶—3500 lb and over; ¶—1000 to 1999 lb.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (natural), lower lake ports. After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in applicable lake vessel rates, upper lake rail freights; dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

Eastern Local Ore

Cents per unit del., E. Pa.

Foundry and basic 56-62% concentrates contract	17.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	17.00
Brazilian iron ore, 68-69%	24.00-25.00

Tungsten Ore

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$65.00
Domestic scheelite, mines	65.00

Manganese Ore

Manganese, 48% nearby, $1.18-$1.22 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.6c.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00

South African Transvaal

44% no ratio	$27.00-28.00
48% no ratio	34.00-35.00

Brazilian

44% 2.5:1 lump	$32.00

Rhodesian

45% no ratio	$20.00-21.00
48% no ratio	28.00
48% 3:1 lump	35.00-36.00
Domestic—rail nearest seller	
48% 3:1	$39.00

Molybdenum

Sulphide concentrates per lb, molybdenum content, mines	$1.00

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 21.75c per lb of contained Cr, c.l., packed 22.65c, ton lot 23.80c, less ton 25.20c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%.) Contract, carload, lump, bulk, max. 0.03% C 33.60c per lb of contained Cr, 0.04% C 31.50c, 0.06% C 30.50c, 0.10% C 30.00c, 0.15% C 29.75c, 0.20% C 29.50c, 0.50% C 29.25c, 1% C 29.00c, 1.50% C 28.85c, 2% C 28.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. S M x D, bulk, 23.25c per lb of contained Cr. C.l., packed 24.15c, ton 25.50c, less ton 27.25c. Delivered Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max.) Contract, carload, packed, S M x D, 16.35c per lb of alloy; ton lot 17.2c; less ton lot, 18.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 21.75c per lb of contained chromium plus 12.4c per pound of contained silicon; 1" x down, bulk 21.90c per pound of contained chromium plus 12.60c per pound of contained silicon, f.o.b. plant; freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 36-39%, Al 7-9%, C 0.05% max.) 21.75c per lb of contained silicon plus 12.4c per lb of contained silicon plus aluminum 3" x down, delivered.

Chromium Metal: (Min. 97% Cr and 1% Fe) Contract carload, 1" x D; packed, max 0.50% C grade, $1.08 per lb of contained chromium ton lot $1.10, less ton $1.12. Delivered. Spot add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.00c per lb of contained Si; packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.8c, ton lot 16.75c, less ton 18.0c. Delivered. Spot, add 0.8c.

Note: Current prices on zirconium, calcium and briquetted alloys appeared on page 89, Dec. 31 issue; manganese, titanium and "other" ferroalloys, page 568, Jan. 7. Refactories prices were published on page 89, Dec. 31.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.5c per lb of contained Si, carload packed 18.7c, ton lot 19.65c, less ton 20.7c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 20.0c per lb of Si, c.l. packed 21.2c, ton lot 22.1c, less ton 23.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe.) Contract, basis f.ob. Niagara Falls, N. Y., lump, carload, bulk, 9.90c per lb of alloy, ton lots packed 11.30c, 200 to 1999 lb 11.65c, smaller lots 12.15c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Crucible-Special Grades** (V 35-55%, Si 2-3.5% max., C 0.8-1% max.), $3.20. **Primes and High Speed Grades** (V 35-55%, Si 1.50% max., C 0.20% max.) $3.30.

Grainal: Vanadium Grainal No. 1, $1 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1"x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

TUNGSTEN ALLOYS*

Ferrotungsten: (70-80%). 10,000 lb W or more, $5.00 per lb of contained W; 20,000 lb W to 10,000 lb W, $5.10; less than 2000 lb W, $5.22.

Tungsten Powder: Carbon Reduced; (W 98.8% min.) 1000 lb or more, $6.00 per lb of contained W; less than 1000 lb W, $6.15.

*Government ceiling prices, effective May 7, 1951, f.o.b. Niagara Falls, N. Y., basis.

CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, as amended Oct. 23, 1951

STEELMAKING SCRAP COMPOSITE

Jan. 10	$43.00
Jan. 3	43.00
Dec. 1951	43.00
Jan. 1951	46.33
Jan. 1947	31.20

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin, and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin.

Grade 1 Basing Point	No. 1 Bundles Dealer, Industrial	No. 1 Heavy Melt Railroad
Alabama City, Ala.	$39.00	$41.00
Ashland, Ky.	42.00	44.00
Atlanta, Ga.	39.00	41.00
Bethlehem, Pa.	42.00	44.00
Birmingham, Ala.	39.00	41.00
Brackenridge, Pa.	44.00	46.00
Buffalo, N. Y.	43.00	45.00
Butler, Pa.	44.00	46.00
Canton, O.	44.00	46.00
Chicago, Ill.	42.50	44.50
Cincinnati, O.	43.00	45.00
Claymont, Del.	42.50	44.50
Cleveland, O.	43.00	45.00
Coatesville, Pa.	42.50	44.50
Conshohocken, Pa.	42.50	44.50
Detroit, Mich.	41.15	43.15
Duluth, Minn.	40.00	42.00
Harrisburg, Pa.	42.50	44.50
Houston, Tex.	37.00	39.00
Johnstown, Pa.	44.00	46.00
Kansas City, Mo.	39.50	41.50
Kokomo, Ind.	42.00	44.00
Los Angeles	35.00	37.00
Middletown, O.	43.00	45.00
Midland, Pa.	44.00	46.00
Minnequa, Colo.	38.00	40.00
Monessen, Pa.	44.00	46.00
Phoenixville, Pa.	42.50	44.50
Pittsburg, Calif.	35.00	37.00
Pittsburgh, Pa.	44.00	46.00
Portland, Oreg.	35.00	37.00
Portsmouth, O.	42.00	44.00
St. Louis, Mo.	41.00	43.00
San Francisco	35.00	37.00
Seattle, Wash.	35.00	37.00
Sharon, Pa.	44.00	46.00
Sparrows Pt., Md.	42.00	44.00
Steubenville, O.	44.00	46.00
Warren, O.	44.00	46.00
Weirton, W. Va.	44.00	46.00
Youngstown, O.	44.00	46.00

Differentials from Base

Differentials per gross ton for other grades of dealer and industrial scrap:

O-H and Blast Furnace Grades

2. No. 1 Busheling	Base
3. No. 1 Heavy Melting	—$1.00
4. No. 2 Heavy Melting	— 1.00
5. No. 2 Bundles	— 1.00
6. Machine Shop Turnings	—10.00
7. Mixed Boring & Short Turnings	— 6.00
8. Shoveling Turnings	— 6.00
9. No. 2 Busheling	— 4.00
10. Cast Iron Borings	— 6.00

Elec. Furnace and Fdry. Grades

11. Billet, Bloom & Forge Crops	+ 7.50
12. Bar Crops & Plate	+ 5.00
13. Cast Steel	+ 5.00
14. Punchings & Plate Scrap	+ 2.50
15. Electric Furnace Bundles	+ 2.00
Cut Structurals & Plate:	
16. 3 feet and under	+ 3.00
17. 2 feet and under	+ 5.00
18. 1 foot and under	+ 6.00
19. Briquetted Cast Iron Borings	Base
Foundry Steel:	
20. 2 feet and under	Base
21. 1 foot and under	+ 2.00
22. Springs and Crankshafts	+ 1.00
23. Alloy Free Turnings	— 3.00
24. Heavy Turnings	— 1.00
25. Briquetted Turnings	Base
26. No. 1 Chemical Borings	— 3.00
27. No. 2 Chemical Borings	— 4.00
28. Wrought Iron	+10.00
29. Shafting	+10.00
30. Hard Steel cut 2 ft & under	+ 3.00
31. Old Tin & Terne Plated Bundles	—10.00

Unprepared Grades

When compressed constitutes:

32. No. 1 Bundles	— 6.00
33. No. 2 Bundles	— 9.00
34. Other than material suitable for hydraulic compression	— 8.00

Restrictions on Use

(1) Prices for Grades 11 and 23 may be charged only when shipped to a consumer directly from an industrial producer; otherwise ceiling prices shall not exceed prices established for Grades 12 and 8, respectively.

(2) Prices established for Grades 26 and 27 may be charged only when sold for use for chemical or annealing purposes, and in the case of Grade 27, for briquetting and direct charge into an electric furnace; otherwise ceiling prices shall not exceed price established for Grade 10.

(3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price shall not exceed ceiling price for corresponding grade of basic open-hearth.

(4) Premiums for Grades 11-18, 20 and 21 may be charged only upon OPS authorization or when sold for use in electric and open-hearth furnaces or foundries.

(5) Prices for Grade 29 may be charged only when sold for forging or rerolling purpose.

(6) Prices for Grade 30 may be charged only when sold upon OPS authorization to a gray iron foundry; otherwise price for Grade 20 will prevail.

Special Pricing Provisions

(1) Sellers of Grades 26 and 27 may make an extra charge of $1.50 per ton for loading in box cars, or 75 cents per ton for covering gondola cars with a weather-resistant covering.

(2) Ceiling price of pit scrap, ladle scrap, salamander scrap, skulls, skimmings or scrap recovered from slag dumps and prepared to charging box size, shall be computed by deducting from the price of No. 1 heavy melting steel of dealer and industrial origin, the following amounts: Where iron content is 85% and over, $6; 75% and over, $10; less than 75%, $12.

(3) Ceiling price of any inferior grade of scrap not listed shall not exceed the price of No. 1 bundles less $15.00.

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap:

2. No. 2 Heavy Melting Steel	—$2.00
3. No. 2 Steel Wheel	Base
4. Hollow Bored Axles and loco. axles with keyways between the wheelseats	Base
5. No. 1 Busheling	— 3.50
6. No. 1 Turnings	— 3.00
7. No. 2 Turnings, Drillings & Borings	—12.00
8. No. 2 Cast Steel and uncut wheelcenters	— 6.00
9. Uncut Frogs, Switches	Base
10. Flues, Tubes & Pipes	— 8.00
11. Structural Wrought Iron and/or steel, uncut	— 6.00
12. Destroyed Steel Cars	— 8.00
13. No. 1 Sheet Scrap	— 9.50
14. Scrap Rails, Random Lengths	+ 2.00
15. Rerolling Rails	+ 7.00
Cut Rails:	
16. 3 feet and under	+ 5.00
17. 2 feet and under	+ 6.00
18. 18 inches and under	+ 8.00
19. Cast Steel, No. 1	+ 3.00
20. Uncut Tires	+ 2.00
21. Cut Tires	+ 5.00
Bolsters & Side Frames:	
22. Uncut	Base
23. Cut	+ 3.00
24. Angles, Splice Bars & Tie Plates	+ 5.00
25. Solid Steel Axles	+12.00
26. Steel Wheels, No. 3 oversize	Base
27. Steel Wheels, No. 3	+ 5.00
28. Spring Steel	+ 5.00
29. Couplers & Knuckles	+ 5.00
30. Wrought Iron	+ 8.00
31. Fireboxes	— 8.00
32. Boilers	— 6.00
33. No. 2 Sheet Scrap	—13.00
34. Carsides, Doors, Car Ends, cut apart	— 6.00
35. Unassorted Iron & Steel	— 6.00
36. Unprepared scrap, not suitable for hydraulic compression	— 8.00

Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise ceiling shall not exceed that for Grade 14.

(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise ceiling shall not exceed that for No. 1 heavy melting steel.

(3) Price for Grade 25 may be charged only when sold for rerolling and forging purposes; otherwise ceiling shall not exceed that for base grade (No. 1).

CAST IRON SCRAP

Ceiling price per gross ton for following grades shall be f.o.b. shipping point:

Cast Iron:

1. No. 1 (Cupola)	$49.00
2. No. 2 (Charging Box)	47.00
3. No. 3 (Hvy. Breakable)	45.00
4. No. 4 (Burnt Cast)	41.00
5. Cast Iron Brake Shoes	41.00
6. Stove Plate	46.00
7. Clean Auto Cast	52.00
8. Unstripped Motor Blocks	43.00
9. Wheels, No. 1	47.00
10. Malleable	55.00
11. Drop Broken Machinery	52.00

Restrictions on Use

(1) Ceiling shipping point price which a basic open-hearth consumer may pay for No. 1 cast iron, clean auto cast, malleable or drop broken machinery cast shall be ceiling price for No. 2 charging box cast.

(2) Ceiling shipping point price which any foundry other than a malleable iron producer may pay for Grade 10 shall be ceiling price for No. 1 cast iron.

Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin authorized by OPS are:

(1) For preparing into Grades No. 3, No. 4 or No. 2, $8.

(2) For hydraulically compressing Grade No. 1, $6 per ton; Grade No. 5, $8.

(3) For crushing Grade No. 6, $3. For preparing into:

(4) Grade No. 25, $6.

(5) Grade No. 26, $6.

(6) Grades No. 12, No. 13, No. 14, No. 16, or No. 20, $10.

(7) Grade No. 17 or No. 21, $11.

(8) Grade No. 18, $12.

(9) For hydraulically compressing Grade No. 15, $8.

(10) For preparing into Grade No. 28, $10.

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be:

(1) For preparing into Grade No. 1 and Grade No. 2, $8.

(2) For hydraulically compressing Grade No. 13, $6.

For preparing into:

(3) Grade No. 16, $4.

(4) Grade No. 17, $5.

(5) Grade No. 18, $7.

(6) Grade No. 21, $4.

(7) Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron are limited to:

(1) For preparing Grade No. 8 into grade No. 7, $9.

(2) For preparing Grade No. 3 into Grade No. 11, $7.

(3) For preparing Grade No. 3 into Grade No. 1, $4.

Whenever scrap has arrived at its point of delivery and consumer engages a dealer to prepare such scrap, no fee may be charged for such services unless consumer obtains prior written OPS approval.

Commissions

No commission shall be payable to a broker in excess of $1.

Premiums for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel where scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace uses or on NPA allocation); $1 for scrap conforming to SAE 52100.

Switching Charges

Switching charges to be deducted from basing point prices of dealer, industrial and nonoperating railroad scrap, to determine ceiling shipping point prices for scrap originating in basing points are per gross ton:

Alabama City, Ala., 43c; Ashland, Ky., 47c; Atlanta, 51c.

Bethlehem, Pa., 52c; Birmingham, 50c; Brackenridge, Pa., 53c; Buffalo, 83c; Butler, Pa., 65c.

Canton, O., 51c; Chicago (including Gary, Ind.), $1.34; Cincinnati (including Newport, Ky.), 65c; Claymont, Del. (including Chester, Pa.), 79c; Cleveland, 76c.

Coatesville, Pa., 59c; Conshohocken, Pa., 20c.

Detroit, 93c; Duluth, Minn., 50c.

Harrisburg, Pa., 51c; Houston, 57c.

Johnstown, Pa., 75c.

Kansas City, Mo., 78c; Kokomo, Ind., 51c.

Middletown, O., 26c; Midland, Pa., 75c; Minnequa, Colo., 33c; Monessen, Pa., 51c.

Phoenixville, Pa., 51c; Pittsburg, Calif., 65c; Pittsburgh (including Bessemer, Homestead, Duquesne, Munhall), 99c; Portland, Oreg., 52c; Portsmouth, O., 51c.

St. Louis (including Federal, Granite City, Ill., St. Louis, Madison, Ill.), 51c; San Francisco (including So. San Francisco, Niles, Oakland), 66c; Seattle, 59c; Sharon, Pa., 75c; Sparrows Point, Md., 20c; Steubenville, O., 51c.

Warren, Pa., 75c; Weirton, 76c.

Youngstown, 75c.

HAMILTON, ONT.

(Delivered Prices)

Heavy Melt	$35.00
No. 1 Bundles	35.00
No. 2 Bundles	35.00
Mechanical Bundles	31.50
Mixed Steel Scrap	31.00
Mixed Borings, Turnings	32.00
Rails, Remelting	35.00
Rails, Rerolling	38.00
Busheling	29.50
Bushelings new factory: Prep'd.	33.00
Unprep'd.	31.00
Short Steel Turnings	32.00
Cast Iron Grades*	
No. 1 Machinery Cast	55.00

* F.o.b. shipping point.

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The powerful, rugged muscles of a charging rhino enable him to propel his tremendous bulk and weight at truly remarkable speed. Nature designed them well for the purpose they have to serve.

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Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

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WEST: THE COLORADO FUEL & IRON CORP.—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
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THE COLORADO FUEL & IRON CORPORATION

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Extra-Low-Carbon STAINLESS STEEL

New Type Chromium-Nickel Steels Have Added Corrosion Resistance

New and improved austenitic stainless steels of the 18-8 type have been developed which have superior corrosion resistance after being exposed to heat. These steels, known as extra-low-carbon stainless steels, were designed especially for use in welded and stress-relieved equipment that is exposed to more severe corrosive conditions than are normally encountered by other types of straight 18-8 stainless steel.

Under severe corrosive conditions, intergranular attack may occur in some of the higher carbon grades of austenitic stainless steels that have been subjected to the temperature range of 800 to 1600 deg. F. during welding or hot forming operations. It is generally agreed that this type of corrosion is caused by complex carbides that are formed at the grain boundaries of the stainless steel during heating.

The effect of heat is rarely harmful in the ordinary fabrication of stainless steel for most applications, such as in architecture, the food and dairy industries, in hospitals, and in the home. However, in the chemical and other allied industries, where stainless steel is used in the handling of very corrosive chemicals, these new extra-low-carbon stainless steels should most certainly find wide use.

Fig. 1 Left: Carbide precipitation at the grain boundaries of an 18-8 stainless steel, containing 0.059 per cent carbon, after being held at 1200 deg. F. for 1 hour. Right: Absence of carbide precipitation in 18-8 stainless steel of 0.03 maximum carbon content, after being held at 1200 deg. F. for the same length of time.

In general, there are three ways in which the precipitation of carbides can be controlled in stainless steel:

1. Heat-treating so that the carbides present are dissolved.
2. Alloying with an element, such as columbium, tantalum, or titanium, that will tie up the carbon in the form of a harmless carbide.
3. Decreasing the carbon content of the steel.

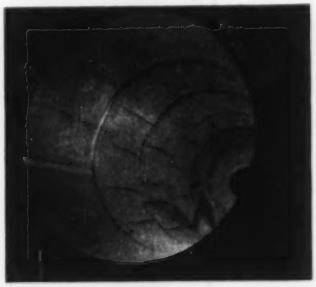


Fig. 2. The new extra-low-carbon stainless steels are especially suited for large types of process equipment, such as this fractionating tower. They require no heat-treatment after welding.

Heat-Treatment After Welding

Before the development of extra-low-carbon stainless steel, or of the "stabilized grades," one means for preventing intergranular corrosion was to heat-treat stainless steel that had been subjected to the dangerous temperature range, so that the precipitated chromium carbides would go back into solid solution. It was found that when a welded part was heated to temperatures of 1950 to 2000 deg. F., and then cooled rapidly, most of the carbides were retained in solid solution. This extra heat-treatment is sometimes impractical, however, because of the design or massive size of some types of welded equipment.

Decreasing Carbon Content

A recent development in preventing intergranular corrosion has been the extra-low-carbon stainless steels. To be substantially harmless in stainless steel for as-welded or welded and stress relieved chemical equipment operating at temperatures under 700 deg. F., carbon must not be present in quantities over 0.03 per cent.

In 1937, ferrochrome with 0.03 per cent maximum carbon was first produced for the steel industry by ELECTROMET. This product has helped make it possible to produce very-low-carbon stainless steels—steels that are completely immune to intergranular corrosion after welding or after subjection to a stress-relieving heat-treatment.

The amount of stabilizing element that is necessary to "fix" carbon in stainless steel is in direct proportion to the carbon content of the steel. Therefore, the lower the carbon the less is the amount of stabilizing element required. Lowering the carbon content is an efficient means of conserving columbium, tantalum, and titanium.

Metallurgical Service Available

If you use welded stainless steel equipment, it will pay you to investigate the advantages of using extra-low-carbon steels. If you produce stainless steel, our metallurgists will be glad to give you technical assistance in the use of ferrochrome of 0.03 per cent maximum carbon. For further information, write to the nearest ELECTROMET office.

For a more detailed account of the properties of extra-low-carbon stainless steel, write for a free copy of the technical paper, "Resistance to Sensitization of Austenitic Chromium-Nickel Steels of 0.03% Max. Carbon Content".

The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.

The Metal Market

Second quarter allotment of copper and aluminum for most civilian uses are being cut to provide larger tonnages for military and atomic energy programs

PROBLEM of making equitable distribution of scarce nonferrous metals is receiving top consideration from government officials as the New Year gets under way.

C. E. Wilson, defense mobilizer, says it is clear military and atomic requirements in second quarter will increase somewhat while supplies will increase by smaller amounts. On the basis of this, further cuts in allotments for less essential uses are in prospect.

He revealed for the first time that withdrawal of 10,000 tons of aluminum from the government's strategic stockpile has been authorized. While there has been no shortage of raw materials necessary for aluminum production to date, fluorspar and sulphuric acid in 1952 may be in such short supply that the production of aluminum may be affected.

Civilian Allotments Cut—Extent to which metal shortages will force curtailments in production of various products in the second quarter was indicated by Manly Fleischmann, defense production administrator. Exact second quarter allotment tonnages are not yet available. Enough copper and aluminum will be allotted to produce 800,000 automobiles and the industry will be allowed to produce 930,000 units if it can get the extra material by conservation measures and further reductions of inventory.

Overall material allotments for consumer goods were cut back by about 10 per cent. Allotments have been increased for "most of the industries" which were cut hardest in the present quarter.

Second quarter allotments of controlled materials for residential construction were cut back about 60 per cent. Allotments for industrial expansion will support projects already under way but will permit only a few new industrial starts.

Commenting on the large increase that has taken place in both direct and indirect materials requirements for military and atomic energy programs, he said the needs for brass mill products and aluminum in these programs were more than half of available supplies.

Lead Supply Output Improves

While supplies of lead, particularly primary soft lead, continue far below demands, you may note an easing in supplies soon. The price of lead in the foreign market is approaching a close balance with that in the domestic market. Metal trade sources expect an increase in the flow of foreign refined lead to American consumers this quarter. It is not expected the price will have to drop as low as 18.25c to 18.50c, Gulf Ports, the equivalent of the domestic 19.00-cent New York ceiling for foreign metal for the metal to start moving here. It is the consensus in New York trading circles that sales at 19.00c to American consumers might resume in volume when the foreign price settled around 19.00c or slightly higher at Gulf ports. Sales have been reported at 19.50c, Gulf Ports.

Smelters of secondary lead have raised their smelting fee for scrap lead battery plates $5 to $7.50 a ton. This is equivalent to a reduction of ¼-cent to ½-cent a pound in the price of battery plates. The action represents the first instance of a scrap metal falling below the established ceilings set up by OPS.

Copper Price Eases Abroad

Resistance to higher foreign copper prices also is noted. Advices from abroad indicate that European buyers are not willing to pay the 54-cent a pound price asked for foreign metal by some nations. The price range for first quarter "premium" copper is placed abroad at around 46.00c with no definite quotations for second quarter delivery.

On the domestic front, officials of copper producing companies urge that the domestic ceiling price be raised to at least 27.50c a pound, the price that foreign producers are paid for the metal by American users.

Cornelius F. Kelley, chairman, Anaconda Copper Mining Co., takes sharp issue with government officials' frequent pronouncements that of the three defense metals—steel, copper and aluminum—copper is and will continue to be in the most critically short supply. He said domestic copper supply "will begin to improve materially during the latter half of 1952."

Zinc Mine To Be Reopened

Domestic supply of slab zinc for stockpiling and other defense needs will be increased by 5500 tons a year by resumption of mining operations in certain properties in the Tri-State Lead-Zinc district. Under an agreement reached by Defense Materials Procurement Agency with American Zinc, Lead & Smelting Co., St. Louis, the company will operate the Quick Seven mine near Neck City, Jasper county, Missouri. The mine will be operated as an open pit.

The company will undertake a $700,000 expansion program at the site of the mine, including the construction of a concentrating mill with a daily capacity of 1000 tons of ore.

DMPA agrees to buy up to 11,000 tons of the slab zinc produced by the new facilities at a price of 17.00c a pound, f.o.b. E. St. Louis, providing the company cannot sell it to other purchasers in the United States at that or a higher price. The present ceiling price on slab zinc is 19.50c a pound.

The agreement will run for two years after the new facilities go into production, which is expected to be within 12 months.

Reynolds To Build Plant

Reynolds Metals Co. issued a letter of intent to C. F. Braun & Co., Alhambra, Calif., for the engineering and construction of a $42 million alumina plant in San Patricio county, Tex. The projected plant, scheduled for completion by January, 1953, will be built adjacent to the aluminum reduction plant being constructed by Reynolds at that point. It will be used to process bauxite shipped directly by ore carrier from Jamaica to the Texas plant near Corpus Christi. It is anticipated that the Texas alumina plant will produce about 1000 tons a day.

When the reduction and alumina plants are completed, it will be one of the few aluminum production operations in the world where the ore goes in on one side of the plant and comes out on the other side as aluminum metal.

Cobalt Production Gains

Production of cobalt metal, oxides and salts in the Free World will increase in the first three months of this year to about 2200 metric tons from an estimated total of 1960 tons in the fourth quarter of last year. The latter estimate is smaller than previous ones on which fourth quarter allocations were based.

Although cobalt output is expanding, requirements for both direct defense and essential civilian consumption are growing to such an extent that they will still greatly exceed availabilities. International Materials Conference issued provisional allocations of cobalt metal, oxides and salts for the first quarter of this year totaling 2196.5 metric tons of metal content. Of this total, the United States may use 1362.4 tons; United Kingdom, 318.1 tons; Federal Republic of Germany, 128.7 tons. These countries alone account for about 82 per cent of the total, 26 other countries receiving the balance.

Makes Magnesium Castings

Gerity Magnesium Corp., wholly-owned subsidiary of Gerity-Michigan Corp., Adrian, Mich., is manufacturing magnesium sand castings for both jet and reciprocating aircraft engines. Peak production capacity of this new division will be reached by September, 1952. The plant, located on a site adjoining that of the parent company in Adrian, is so designed that its capacity can be doubled by adding another section without interrupting production.

Gerity - Michigan Corp.'s Logan street plant is producing armor plate in large quantities as a subcontractor to Standard Steel Spring Co., Coraopolis, Pa.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c, Conn. Valley, Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 27.25c; 88-10-2 (No. 215) 38.50c; 80-10-10 (No. 305) 32.25c; No. 1 yellow (No. 405) 23.25c.

Zinc: Prime western 19.50c; brass special 19.75c; intermediate 20.00c, East St. Louis; high grade 20.85c, delivered.

Lead: Common 18.80c; chemical 18.90c; corroding 18.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c; pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

Secondary Aluminum: Piston alloys 20.50c; No. 12 foundry alloy (No. 2 grade) 19.50c; steel deoxidizing grades, notch bars, granulated or shot; Grade 1, 18.00c; grade 2, 17.75c; grade 3, 17.25c; grade 4, 16.50c.

Magnesium: Commercially pure (99.8%+) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt 103.00c.

Antimony: American 99-99.8% and over but not meeting specifications below 50.00c; 99.8% and over (arsenic 0.05% max., other impurities 0.1% max.) 50.50c, f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9% base sizes at refinery, unpacked, 56.50c; 25-lb pigs 59.15c; "XX" nickel shot, 60.15c; "F" nickel shot or ingots, for addition to cast iron, 56.50c. Prices include import duty.

Mercury: Open market, spot, New York, $209-$212 per 76-lb flask.

Beryllium Copper: 3.75-4.25% Be, $1.50 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: $7.99/lb; $2.40 per lb for 500 lb (kegs); $2.42 per lb for 100 lb (case); $2.47 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 88.00c per oz.

Platinum: $90-$93 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Ceiling prices, cents per pound, f.o.b. mill, effective Aug. 23, 1951)

Sheet: Copper 41.68; yellow brass 38.28; commercial bronze, 95% 41.61; 90% 41.13; red brass, 85% 40.14; 80% 39.67; best quality, 39.15; nickel silver, 18% 53.14; phosphor-bronze grade A, 5% 61.07.

Rod: Copper, hot-rolled 37.53; cold-drawn 38.78; yellow brass free cutting, 32.63; commercial bronze, 95% 41.30; 90% 40.82; red brass 85% 39.83; 80% 39.36.

Seamless Tubing: Copper 41.72; yellow brass 41.29; commercial bronze, 90% 43.79; red brass, 85% 43.00.

Wire: Yellow brass 38.57; commercial bronze, 95% 41.90; 90% 41.42; red brass, 85% 40.43; 80% 39.96; best quality brass 39.44.

(Base prices, effective Dec. 26, 1951)

Copper Wire: Bare, soft, f.o.b. eastern mills, 100,000 lb lots, 28.545; 30,000 lb lots 28.67; l.c.l., 29.17. Weatherproof, 100,000 lb, 30.35; 30,000 lb, 30.60; l.c.l., 31.10. Magnet wire, del., 15,000 lb or more, 34.50; l.c.l., 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders)

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range Inches	Widths or Diameters, Inc.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	....	....
0.135-0.096	12-48	30.6	....	....
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Dia. (in.) or distance across flats	Round— R317-T4, 178-T4	R-317-T4	Hexagonal— 178-T4
0.125	52.0	....	....
0.156-0.0188	44.0	....	....
0.219-0.313	41.5	....	....
0.375	40.0	46.0	48.0
0.406	40.0	....	....
0.438	40.0	46.0	48.0
0.469	40.0	....	....
0.500	40.0	46.0	48.0
0.531	40.0	....	....
0.563	40.0	....	45.0
0.594	40.0	....	....
0.625	40.0	43.5	45.0
0.688	40.0	....	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	....	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	....	....
1.625	36.5	....	39.5
1.688-2.000	36.5	....	....

LEAD

(Prices to jobbers f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $24.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $24.00 per cwt. Traps and bends: List prices plus 65%.

ZINC

Sheets 26.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 25.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 25.50-26.50c; over 12-in., 26.50-26.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 77.00c. Strip, cold-rolled, 83.00c. Rods and shapes, 73.00c. Plates, 75.00c. Seamless tubes, 106.00c.

MONEL

(Base prices f.o.b. mill)

Sheets, cold-rolled 60.50c. Strip, cold-rolled 63.50c. Rods and shapes, 58.50c. Plates, 59.50c. Seamless tubes, 93.50c. Shot and blocks, 53.50c.

MAGNESIUM

Extruded Rounds 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flakes, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat, rolled, 38.34c; oval 37.84c.

Nickel Anodes: Rolled oval, carbonized, carloads, 74.50c; 10,000 to 30,000 lb, 75.50c; 3000 to 10,000 lb, 76.50c, 500 to 3000 lb 77.50c; 100 to 500 lb, 79.50c; under 100 lb, 82.50c; f.o.b. Cleveland.

Nickel Chloride: 36.50c in 100 lb bags; 34.50c in lots of 400 lb through 10,000 lb; 34.00c over 10,000 lb, f.o.b. Cleveland, freight allowed on 400 lb or more.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 77.7c; 100 or 350 lb drums only, 100 to 600 lb, 63.1c; 700 to 1900 lb, 60.6c; 2000 to 9900 lb, 58.9c. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Tin Anodes: Bar, 1000 lb and over, $1.19; 500 to 999 lb, $1.195; 200 to 499 lb, $1.20; less than 200 lb, $1.215. Freight allowed east of Mississippi and north of Ohio and Potomac.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums, 45.7c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb $1.0099; more than 2000 lb, 98.09c. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Stannous Chloride (Anhydrous): In 400 lb bbl, 87.23c; 100 lb kegs 88.23c. Freight allowed.

Scrap Metals

Brass Mill Allowances

Ceiling prices in cents per pound for less than 20,000 lb, f.o.b. shipping point, effective June 26, 1951.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.50	21.50	20.75
Yellow Brass	19.125	18.875	17.875
Commercial Bronze			
95%	20.50	20.25	19.75
90%	20.50	20.25	19.75
Red Brass			
85%	20.25	20.00	19.375
80%	20.125	19.875	19.375
Muntz metal	18.125	17.875	17.375
Nickel silver, 10%	21.50	21.25	10.75
Phos. bronze, 5%	25.25	25.00	24.00

Copper Scrap Ceiling Prices

(Base prices, cents per pound, less than 40,000 lb f.o.b. point of shipment)

Group I: No. 1 copper 19.25; No. 2 copper wire and mixed heavy 17.75; light copper 16.50; No. 1 borings 19.25; No. 2 borings 17.75; refinery brass, 17.00 per lb of dry Cu content for 50 to 60 per cent material and 17.25 per lb for over 60 per cent material. Group II: No. 1 soft red brass solids 18.50; No. 1 composition borings 19.25 per lb of Cu content plus 63 cents per lb of tin content; mixed brass borings 19.25 per pound of Cu content plus 60 cents per lb of tin content; unlined red car boxes 18.25; lined red car boxes 17.25; cocks and faucets 16.00; mixed brass screens 16.00; zincy bronze solids and borings 16.25.

Zinc Scrap Ceiling Prices

(Cents per pound, f.o.b. point of shipment)

Unsweated zinc dross, 13.75c; new clippings and trimmings, 15.50c; engravers' and lithographers' plates, 15.50c; die cast slabs, min. 90% zinc, 13.75c; old zinc scrap, 12.25c; forming and stamping dies, 12.25c; new die cast scrap, 11.75c; old zinc die cast radiator grille, 11.50c; old die cast scrap, 10.50c.

Lead Scrap Ceiling Prices

(F.o.b. point of shipment)

Battery lead plates, 15.00c per lb of lead and antimony content, less smelting charge of 2 cents per lb of material in lots 15,000 lb or more; less 2.25c in lots less than 15,000 lb, or a flat price of 11.25c a pound of battery plates. Used storage batteries (in boxes) drained of liquid, 7.65c for 15,000 lb or more; 7.45c for less than 15,000 lb. Soft lead scrap, hard lead scrap, battery slugs, cable lead scrap or lead content of lead-covered cable scrap, 17.25c in lots of 20,000 lb or more; 16.50c in lots under 20,000 lb.

Aluminum Scrap Ceiling Prices

(Cents per pound f.o.b. point of shipment, less than 5000 lb)

Segregated plant scrap: 2s solids, copper free, 10.50; high grade borings and turnings, 8.50; No. 12 piston borings and turnings, 7.50; Mixed plant scrap: Copper-free solids, 10.00; dural type, 9.00; Obsolete scrap: Pure old cable, 10.00; sheet and sheet utensils, 7.25; old castings and forgings, 7.75; clean pistons, free of struts, 7.75; pistons with struts, 5.75.

DAILY PRICE RECORD

1952	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Jan. 2-10	24.50	18.80	19.50	103.00	19.00	50.00	56.50	88.00
1951								
Dec. 1-31	24.50	18.80	19.50	103.00	19.00	50.00	56.50	88.00
Dec. Avg.	24.50	18.80	19.50	103.00	19.00	50.00	56.50	88.00
Nov. Avg.	24.50	18.80	19.50	103.00	19.00	44.56	56.50	88.00
Oct. Avg.	24.50	18.726	19.426	103.00	19.00	42.00	56.50	88.12
Sept. Avg.	24.50	16.80	17.50	103.00	19.00	42.00	56.50	90.16
Aug. Avg.	24.50	16.80	17.50	103.00	19.00	42.00	56.50	90.16
July Avg.	24.50	16.80	17.50	106.00	19.00	42.00	56.50	90.16
June Avg.	24.50	16.80	17.50	117.962	19.00	42.00	56.50	88.492
May Avg.	24.50	16.80	17.50	139.923	19.00	42.00	50.50	90.16
Apr. Avg.	24.50	16.80	17.50	143.735	19.00	42.00	50.50	90.16

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99% del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked. Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plates . . .

Plate Prices, Page 95

Boston—Plate fabricators are slow to estimate forward volume due to uncertain plate supply. Some are supplementing domestic tonnage with foreign steel. Shipbuilding is gradually expanding with new defense contracts for steel patrol ships awarded one Boston district yard.

New York—Plate production from continuous mills has improved slightly balance in the lighter gages. Large diameter pipe continues to take substantial volume and tank volume is sustained by underground fuel storage systems. Second quarter plate schedules are filled.

Seattle—U. S. Engineer, Portland, Oreg., is analyzing two identical bids, except for acceptance periods, for furnishing 6200 tons of sheet steel and T-section piling for The Dalles dam, Columbia river.

Sheets, Strip . . .

Sheet and Strip, Page 95 & 96

Cleveland — Cutbacks in civilian durable goods will not materially alter supply conditions in the flat-rolled products in second quarter. Slack in demand attending the cutbacks will be offset by diversion of tonnage to defense account and utilization of rolling facilities to production of light plates. Cold-rolled sheets are not as plentiful as some buyers had anticipated. Neither are silicon grades, demand for which is noticeably on the upturn since opening of the new year. Galvanized sheets are tight, not only because of curtailed production due to shortage of zinc, but because so much of the tonnage available for the general market is directed to warehouses under government regulations. Carryover tonnage from fourth quarter was substantial, in the case of some mills running to about a month's production. Expectations are there will be similar carryover from first to second quarter. Caring for the carryover tonnage will restrict mill bookings. Under government order carryover tonnage must be cared for in the first open month available.

New York — Carryovers on hot-rolled and cold-rolled sheets limit new tonnage, reducing new commitments up to 30 per cent in some cases. Second quarter schedules are filling. They would be fully taken up but for uncertainty as to capacity required to fill deliquent tonnage. Cold-rolled carbon sheets have not eased materially.

Boston—Slackening demand for narrow cold-rolled strip has not brought cutbacks in regular allocations of hot-rolled by converters. Inventories of the latter are heavier but for second quarter all tonnage due under allotments is scheduled for delivery.

Pittsburgh—Demand remains strong for most flat-rolled products. Hot-rolled and galvanized are holding-up well but long ternes are in good supply-demand balance. Silicon grades are easily available. In fact, mills are looking for business. Year-end carryover will be small—between 7 and 14 days production depending on product.

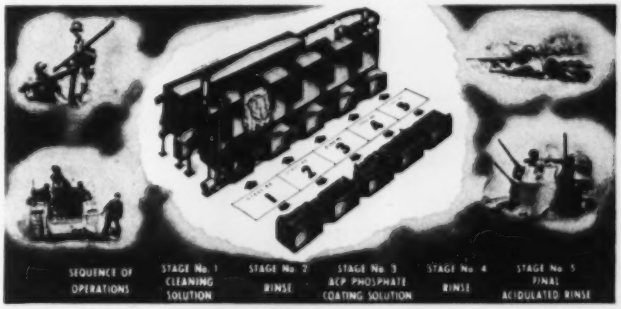
Detroit—Some steel consumers re-

AMERICAN CHEMICAL PAINT COMPANY

AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet

Subject: METAL PRESERVATION AND PAINT PROTECTION WITH ACP PHOSPHATE COATING CHEMICALS


SEQUENCE OF OPERATIONS
STAGE No. 1 CLEANING SOLUTION
STAGE No. 2 RINSE
STAGE No. 3 ACP PHOSPHATE COATING SOLUTION
STAGE No. 4 RINSE
STAGE No. 5 FINAL ACIDULATED RINSE

U.S. ARMY PHOTOGRAPHS COURTESY OF "ORDNANCE MAGAZINE"

Typical spray and dip phosphating equipment and some ordnance products that are now given a protective phosphate coating for extra durability under all kinds of severe exposure conditions. Both military and civilian applications of ACP phosphate coating chemicals are shown in the chart below.

SELECTION CHART OF ACP PROTECTIVE COATING CHEMICALS FOR STEEL, ZINC, AND ALUMINUM

METAL	ACP CHEMICAL	OBJECT OF COATING	TYPICAL METAL PRODUCTS TREATED	GOVERNMENT SPECIFICATIONS
STEEL	"GRANODINE" Zinc Phosphate Coating Chemical	Improved paint adhesion	Steel, iron, or zinc fabricated units or components, automobile bodies, refrigerators, washing machines, cabinets, etc., projectiles, rockets, bombs, rifles, small arms, belt links, cartridge cases, vehicular sheet metal, tank belts and links, recoilless guns, etc.	MIL-S-5002 AAR-C-498, Grade I AAR-F-495 U.S.A. 57-0-2, Type II, Class C U.S.A. 51-76-1, Finish 22.02, Class C U.S.A. 50-68-1 16 E4 (Ships)
	"PERMADINE" Zinc Phosphate Coating Chemical	Rust and corrosion prevention	Nuts, bolts, screws, hardware items, tools, guns, cartridge clips, fire control mechanisms, metallic belt links, steel aircraft parts, certain steel projectiles and many other components.	MIL-C-16232 U.S.A. 57-0-2, Type II, Class B U.S.A. 51-76-1, Finish 22.02, Class B Navy Aeronautical W-364 U.S.A. 72-53 (See Ao-F-20)
	"THERMOIL-GRANODINE" Manganese-iron Phosphate Coating	Wear-resistance anti-galling, safe break-in of friction or rubbing parts. Rust proofing.	Friction surfaces such as pistons, piston rings, gears, cylinder liners, camshafts, tappets, crankshafts, rocker arms, etc. Small arms, weapon components. Hardware items, etc.	MIL-C-16232 U.S.A. 57-0-2, Type II, Class A U.S.A. 51-76-1, Finish 22.02 Class A Navy Aeronautical W-364 U.S.A. 72-53 (See AR-F-20)
	"GRANODRAW" Zinc-iron Phosphate Coating	Improved drawing, extrusion, and cold forming	Blanks and shells for cold forming, heavy stampings, tube, tubing for forming or drawing, wire, rod, etc.	———
ALUMINUM	"ALODINE" Protective Coating	Improved paint adhesion and corrosion resistance	Aluminum products of similar design such as refrigerator parts, wall tile, signs, washing machine tubs, etc. aircraft and aircraft parts, bazookas (rocket launchers), helmets, belt buckles, clothes dryers, clothesline, rocket motors, etc., aluminum strip or sheet stock.	MIL-C-5541 (See also QPL-5541-1) MIL-S-5002 AN-F-20 U.S. Navord O.S. 675 16 E4 (Ships) AN-C-176 (See MIL-C-5541) U.S.A. 72-53 (See AR-F-20)
ZINC	"LITHOFORM" Zinc Phosphate Coating Chemical	Improved paint adhesion	Zinc alloy die castings, zinc or cadmium plated sheet or components, hot dip galvanized stock, gravemeyer, signs, siding, roofing, galvanized truck bodies, etc.	QQ-P-416 AN-C-82 JAN-F-495 AR-F-20 U.S.N. Appendix S U.S.A. 72-53 (See AR-F-20)

CHEMICALS ACP PROCESSES

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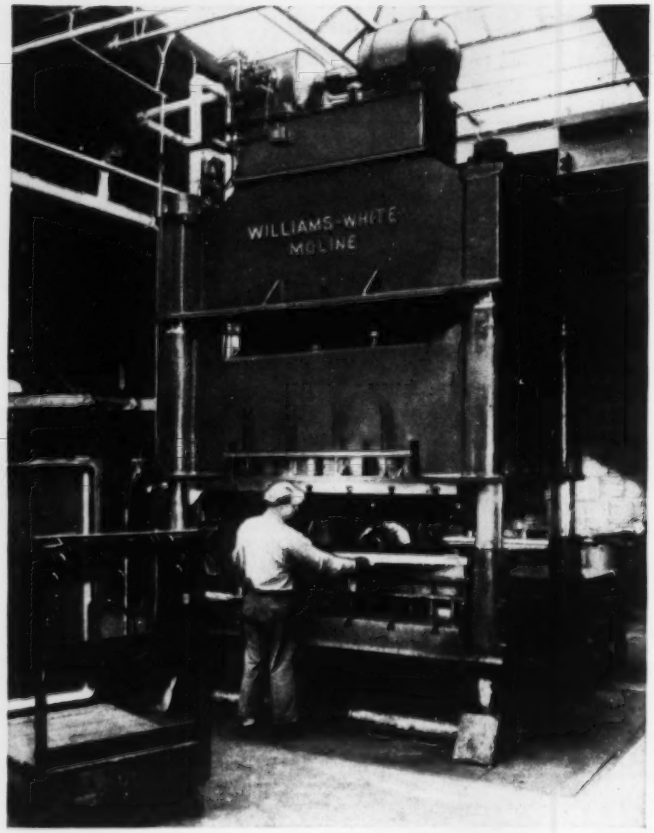
CHEMICALS ACP PROCESSES

Drawing Freezer Tops . . . on versatile 400-Ton WILLIAMS-WHITE Press



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port inventories are higher now than in years and a few of them to stay within the legal limit have had to sell stocks. This situation applies particularly to cold-finished sheets.

Cincinnati—Pressure on sheet mills for second quarter tonnage does not carry the urgency seen in 1951. Defense needs continue on the uptrend but declines in civilian requirements are abrupt and may bring an easier supply situation by third quarter.

Chicago — Except for cold-rolled sheets there is little indication of softening requirements ahead. Production of hot-rolled sheets and strip is not sufficient to accommodate all CMP tickets for second quarter.

Stainless Steel . . .

Stainless Steel Prices, Page 99

Washington—An additional 75 million pounds of straight chromium stainless steel in all forms except tubing are available for shipment to fabricators in first quarter. Release of this tonnage by NPA will relieve pressure on copper, nickel, brass, and zinc wherever fabricators can use it as a substitute.

Steel Bars . . .

Bar Prices, Page 95

New York—New defense contracts are taking heavier volume of bars for second quarter. Some mills will be unable to supply hot-topped bars to warehouses and other buyers in second quarter. Shell steel directives, forge shop needs and fuse contracts are taking a greater share of quality bars in the larger sizes. Drop forgers need nickel alloy steel to meet defense orders. They want the 45 day inventory limitation extended, pointing out average industry inventory the last five years was 96 days.

Boston—Additional defense requirements are taking a heavier share of larger high quality steel bars. The fuze program is bolstering inquiry in one shop to approximately 600 tons monthly. This is work in the Gardner, Mass., district where civilian goods demand has slumped sharply. Most mills are committeed through second quarter on hot-rolled carbon bars.

Pittsburgh — Pressure continues strong for bars. While some easing in the smaller carbon sizes is noted in other areas, such is not the experience with district mills. First quarter books are filled and second quarter bookings are starting at a slow pace with mills feeling their way to be sure customers are properly taken care of in meeting CMP ticket requirements. Year-end carryover was substantial.

Cleveland — Bar sellers anticipate steady expansion in requirements on military and related defense account. Heavy tonnage still is moving to automotive and other regular consumers and pressure on the mills shows no signs of easing despite cutbacks in civilian goods allotments. Most producers are booked well into second quarter and could be booked farther ahead were they inclined to accept orders far into the future.

Detroit — One local purchasing agent reports his steel allotments have built up his inventory far beyond what he normally would keep

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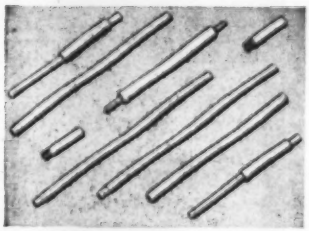

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under normal circumstances, but even so he is stymied by lack of proper sizes in bars and occasionally in sheets.

Chicago — Demand for forging grade and cold-finished top current bar demand. The latter continue particularly tight with defense requirements growing faster than civilian uses drop off.

Wire . . .

Wire Prices, Page 97

New York — Overall demand for wire products is easier with some cancellation of heading stock orders. Softness is due largely to cutbacks in consumer durable goods but large tonnage, notably specialties for defense programs, tends to lag. Rods are in slightly better supply.

Boston—Soft spots in buying have opened additional space in second quarter wire schedules. Rod tonnage is steadily improving.

Tin Plate . . .

Tin Plate Prices, Page 96

Washington—Exports of production tin plate now are being licensed for shipment only to regular consumers in friendly importing countries, and secondary tin plate products only to regular consumers and recognized distributors. This policy, in effect in 1947-49, was reinstituted by the Office of International Trade to provide an additional aid in distributing the limited export quotas of tin plate equitably among importing countries.

Structural Shapes . . .

Structural Shape Prices, Page 95

Cleveland — Under government restrictions on construction, structural fabricators are booking new business cautiously. Seasonal influences also are a retarding influence though chief difficulty stems from shortage of shapes.

Interest in the market centers in the state government's efforts to obtain from the National Production Authority an allocation for steel for the proposed Ohio turnpike, a 242-mile super-highway which it is estimated will require a total of about 250,000 tons of steel. If the project is to get under way by summer the NPA must give approval of a first allotment of 75,000 tons for third and fourth quarters of this year.

Numerous bridges are included in the project, including four large structures to span the Maumee, Huron, Sandusky and Cuyahoga rivers, and also bridges spanning 281 other streams. The turnpike also will cross 36 railroads and require 298 highway grade separation spans. Decision on the state's request for an allotment will be made later by NPA.

Boston—Larger structural shops have filled books for second quarter with some revalidated volume. New volume of structural steel up for fabrication is off sharply with indications pointing toward some easing in structural supply in second half.

New York—Structural fabricators seek to get on earliest quarterly rolling schedules regardless of timing and completion of drawings. This is becoming more difficult through revali-

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dation of tonnage carried over from previous quarters. Trenton, N. J., fabricator booked 10 lighters for use in New York harbor by the Pennsylvania Railroad.

Pittsburgh—Demand is heavy for all types. Books are filled for first quarter. Second quarter business is entered slowly by most producers. Military orders are booked without delay. On normal business mills are feeling their way to be sure CMP tickets of regular customers get full consideration. Year-end carryover tonnage was as heavy in all sizes as the mills expected.

Chicago — While structural fabricators are operating at a good clip they are hindered by short shape supply. City of Chicago has renewed its recently denied applications for 5342 tons of sheet piling for a cofferdam to surround a new lake front water filtration plant.

Seattle—With steel in short supply, wood is giving increasing competition in Army construction jobs. Five warehouses at Auburn, Wash., originally calling for 5000 tons of shapes, have been redesigned for wood.

Tubular Goods . . .

Tubular Goods Prices, Page 99

Boston—Merchant pipe distributors are taking full allotments for second quarter. There is more trading among themselves to meet wanted sizes and grades. Galvanized pipe is in short supply. One mill is resuming shipments of galvanized in February on a limited quota basis after holding back on that grade for several months.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 95

Boston—Closing on 3100 tons of concrete reinforcing bars leaves volume of unplaced tonnage lowest in months, 2200 tons being for a housing project. Less bar tonnage is being estimated. Distributors and fabricators have backlogs extending well into this year. More Belgian steel is being offered.

Seattle — Northwest Steel Rolling Mills resumed production after two weeks shutdown for repairs. No new contracts of importance are noted but considerable tonnage pends, including 4000 tons reinforcing bars for Albeni Falls powerhouse, 500 tons for a local plant and 500 tons for Boeing's local engineering office building.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 99

Cleveland—Coke sellers are looking for orders with demand from the foundries noticeably less pressing. Cutbacks in civilian goods manufacture are reflected in sharply slackened operations at some foundries, chiefly the light castings shops, and with coke easily available buyers are not inclined to order heavily for inventory.

Youngstown — Due to ending of Sharon Steel Corp.'s operation of a government coke plant at Morgantown, W. Va., it is expected the company will be in the market for 600

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to 700 tons of coke daily to make up the resulting deficiency in supplies for its Youngstown district blast furnaces.

Chicago—Foundry coke supply is more than adequate to meet present demand. Foundries are gearing their purchases closely to melting rates.

Pig Iron . . .

Pig Iron Prices, Page 94

Chicago—Fear exists that foundries may be squeezed on pig iron soon now that scrap shortage has started to reduce steelmaking in this district. Mills may be forced to put more of their blast furnace product into their own steel furnaces. As matters stand pig iron has just about been matching foundry melting requirements.

Buffalo—With one stack down for repairs the merchant pig iron situation in western New York shows little sign of easing. Tapering shipments to Michigan motor castings shops are counter-balanced by increased demand from foundries with defense orders.

Pittsburgh—Demand for merchant iron remains firm with foundries busy on defense and consumer castings. Where consumer items fell off, military and defense business filled the gap.

Cleveland—Merchant pig iron sellers are under less pressure for shipments than they were a month or so back. While there is no surplus of iron consumer requirements are definitely off, reflecting in part inventory limitations under government regulations, and, of course, cutbacks in civilian goods manufacture which have resulted in sharp curtailment in light casting production.

Detroit—Merchant pig iron supply situation here is noticeably easier. Some foundrymen find it necessary to refuse shipments because of the legal limits on inventories.

Youngstown—Installation of a third large turbo blower at its Ohio works blast furnaces is planned by U. S. Steel Co. Last summer the company installed two large blowers which enabled it to raise pig iron output 220,000 tons a year.

St. Louis—The district's supply of pig iron dropped nearly 50 per cent when Granite City Steel's A blast furnace went down for a hearth failure. Repairs will require three months.

Scrap . . .

Scrap Prices, Page 102

Pittsburgh — The critical scrap shortage here has caused curtailment of steel production. U. S. Steel has entered upon a program which will take five of its open-hearth furnaces out of production each day. It does not expect to have the same five units out of operation each day but will schedule so repairs can be made where scrap supply is currently the worst. Some mills have a 12-14 day supply on hand. Others are operating on a day-to-day basis. One mill in a more favorable supply position reports incoming shipments only at 50 per cent of consumption.

Buffalo—Two mill consumers here are cheered by NPA orders placed with dealers to replenish scrap stocks.

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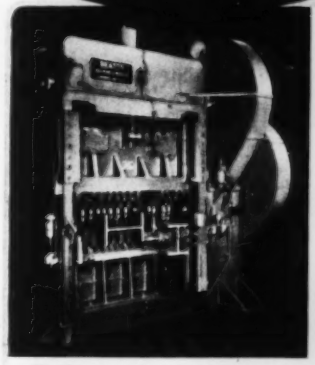
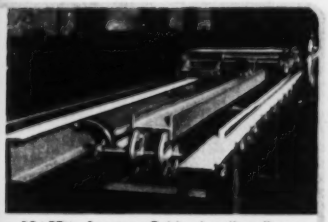
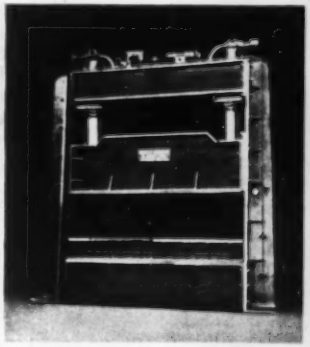


BEATTY No. 9 Guillotine Beam Punch for flange and web punching of beams up to 30".

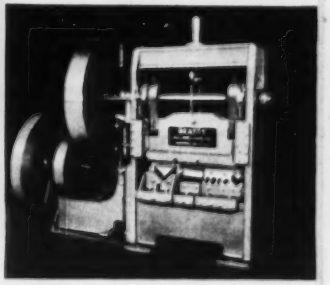


BEATTY Spacing Table handles flange and web punching of beams without roll adjustment.

BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.



BEATTY 400-ton Hydraulic Vertical Bulldozer for heavy forming and pressing.



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Substantial improvement is noted in receipts. Warm weather is a stimulating factor.

Detroit—Local mills, though not yet in danger of shutting down for lack of scrap, are much more concerned than they were two weeks ago. Part of the problem is the weather. Heavy allocation of dealer scrap to other districts is worrying mills. Blast furnace grades and foundry scrap remain fairly plentiful. In the last three months the auto industry has collected almost 76,000 tons of dormant scrap.

Cleveland—Mills in this district have small stocks of scrap and are dependent upon steady receipts to maintain operations. Biggest danger here is possibility scrap now scheduled for shipment to this district may be diverted to mills in even a more critical situation. Dealers report a satisfactory flow of industrial scrap. Some gray iron foundries have reduced their melts, but this has not lessened the overall demand for cast iron grades.

Cincinnati — Effects of year-end lags and severe weather are felt in the scrap market, creating a critical supply situation at district mills. Steel foundries are pressing for scrap but easier situation is current in other foundries.

Chicago—Scrap shortage for which snow and cold weather are partially responsible is reducing steelmaking operations. Ten days ago Gary works of U. S. Steel idled three open hearths and is losing about 1600 tons of ingots daily. Scrap inventory is down to one day's supply at that plant. Other mills are losing inventory but have not lost ingot for scrap lack. The Chicago area scrap drive, which netted about 50,000 tons of dormant scrap in recent weeks, has been resumed on an emergency basis.

St. Louis—Bad weather sent scrap shipments last week to the lowest point in months. Mills are frantically canvassing fabricators for supplies.

San Francisco—Steel mills are holding their own in the matter of scrap supplies, but it is a struggle. Resentment is expressed against an accelerated NPA tendency to allocate scrap from one mill or territory to another.

Seattle—Scrap supply is critical. Local buyers are taking in material from Idaho and Montana. The largest mill here reports its December receipts equalled consumption.

Rails, Cars . . .

Track Material Prices, Page 97

Seattle—Orders were placed by the railroads for 2700 tons of tie plates, and accompanying track nuts and bolts, with Bethlehem Pacific Coast Steel Corp.

Iron Ore . . .

Iron Ore Prices, Page 101

Seattle—Shipment of 60,000 tons of iron ore monthly from British Columbia to Japan is planned by C. T. Takahashi Co., exporter. Argonaut Mining Co. is developing workings at Quinsam Lake, 26 miles from Campbell River, B. C., where a magnetite separation mill has been installed.

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Warehouse . . .

Warehouse Prices, Page 101

Detroit—Some warehouses report noticeable betterment in their stock position. One interest says it has not had so much material since the war. Even the most wanted gages of plate are starting to back up here and many sizes of structurals which used to go out immediately are in stock.

Boston—Allocations to warehouse are generally behind schedule, notably on standard carbon products. Distributors have difficulty in improving inventory balance despite some slackening in demand. Hot-rolled strip deliveries have improved, also bessemer bar receipts.

Cleveland—Warehouses in this area are under somewhat less pressure for tonnage as result of the cutbacks in civilian goods manufacture. At the same time distributors' stocks of some products are improving, noticeably light, flat-rolled items.

Chicago—Receipts from mills are on a higher basis but warehouses still fall far short in satisfying demand of consumers.

Los Angeles—Warehouse activity is 10 per cent greater than in December. Steel receipts under amended M-6 are only slightly larger than previously because most West Coast mills have been delivering to warehouses more than 85 per cent of base period tonnage heretofore required under M-6.

San Francisco—Quotational mark-ups and markdowns, ranging to $2 a ton either way, have been placed into effect fairly generally by warehousing interests in this area as a result of CPR 98.

Seattle—While costs vary among distributors, the majority of warehouses here are quoting on practically the same price levels. Competition forces adoption of the lowest established price.

Canada . . .

Toronto, Ont.—Production of primary iron and steel shapes in Canada totaled 410,348 net tons in October and included 398,550 tons of carbon and 11,797 tons of alloy steel shapes. This compares with 374,882 tons in September and 376,953 in October, 1950.

Shipments for sale in October totaled 269,539 net tons and included 256,999 tons of carbon and 12,540 tons of alloy steel shapes. Shipments included 5664 tons of semifinished shapes; 18,763, structurals; 16,953, plates; 15,582, rails; 6697, tie plates and track materials; 49,568, hot rolled bars; 24,385, pipes and tubes; 30,550, wire rods; 25,322, black sheets; 9109 galvanized sheets; 10,394, castings; 49,934, other rolled products.

Of October shipments 44,820 tons went to railways and car shops; 14,816 to pressing, forming and stamping plants; 38,053 to merchant trade products; 36,628 to building construction; 24,294 to containers industry; 14,018 to agricultural equipment; 20,391 to automotive industry; 14,186 to machinery plants; 3546 to shipbuilding; 11,903 to mining, lumbering, etc., and 11,004 to miscellaneous industries. Wholesalers and ware-

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housing accounted for 26,774 tons and exports for 9034 tons.

Toronto, Ont.—Iron and steel production is maintained at record rate. For November, 1951, pig iron output was 223,467 net tons, comparing with 224,511 in October and 208,301 for November, 1950. For 11 months ending November, production was 2,332,113 net tons, a new record.

Production of steel ingots and castings for November was 307,075 net tons comparing with 309,414 in October and 289,488 in November, 1950. For the 11 months production attained 3,270,716 net tons.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

100 tons, public schools, Spanaway and Port Angeles, Wash.; to Leckenby Structural Steel Co., Seattle.

STRUCTURAL STEEL PENDING

3800 tons, galvanized steel transmission towers; Bethlehem Pacific Coast Steel Corp., Seattle, low to Bonneville Power Administration, Portland, Oreg.

3500 tons, five Army warehouses, Auburn, Wash.; bids rejected; new bids invited, based on government-design laminated wood.

2500 tons, estimated, South End bridge, Connecticut river, Springfield-Agawam, Mass.; bids Jan. 15, Department of Public Works, state, Boston, substructure, 100 tons bars.

300 tons, machine shop, McNary dam, bids to U. S. Engineer, Walla Walla, Wash., Jan. 12.

300 tons, warehouse, Elmendorf air field, Alaska; bids in to U. S. Engineer, Jan. 8.

260 tons, gates, trackracks, etc., Albeni Falls powerhouse, Washington state; bids to U. S. engineer, Seattle, about March 6; project also includes 250-ton overhead bridge crane.

250 tons, state bridge, Mattawamkeag river, Haynesville, Aroostook county, Maine; bids in; also on erection only of 188 tons, for two state bridges, Bowdoinham and Dover-Foxcroft, Me.

250 tons, bridge crane for Albeni Falls dam project; Moffett Engineering Co., Albany, Calif., apparently low $199,650 to U. S. Engineer, Seattle.

200 tons, Ship Creek, Alaska, bridge; A. J. Hopper Co., Seattle, low $174,999, to Alaska Railroad, latter furnishing steel.

135 tons, Washington state overcrossing, Lewis county; bids to Olympia, Jan. 15.

100 tons, guides, frames, cleats etc.; bids to U. S. Engineer, Walla Walla, Wash., Jan. 22.

Unstated, Toklat river bridge, Mt. McKinley National Park, Alaska; sole bid of Wm. A. Smith Construction Co., Kansas City, Kans., $326,476, rejected by Alaska Road Commission, Juneau; no date set for rebid.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2200 tons, housing project, Roxbury district, Boston, to Bethlehem Steel Co.; John Bowen Construction Co., Boston, general contractor.

1500 tons, outside utilities, Ladd air field, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle; Sound Construction & Engineering Co., Seattle, general contractor.

750 tons, TWA hangar, Midway airport, Chicago, to United States Steel Supply Co., Chicago.

700 tons, power plant, Duquesne Light Co., Elrama, Pa., to United States Steel Supply Co., Pittsburgh.

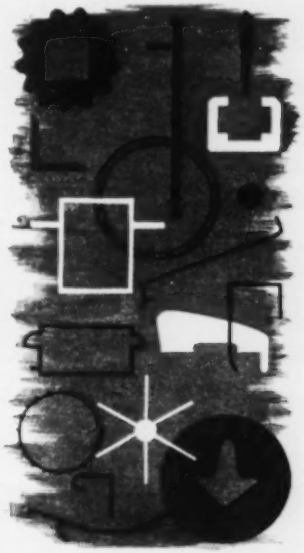
630 tons, water filtration plant, Gary, Ind., to Bethlehem Steel Co.; S. N. Nielsen Co., Chicago, contractor.

600 tons, overpass Forest Hills district, Boston, to Bethlehem Steel Co.; Tarsuni Construction Co., Boston, general contractor.

310 tons, state bridges, Lancaster-Harvard, Mass., to Truscon Steel Co., Boston; Bayer & Mingolia Construction Co., Worcester, Mass., general contractor.

225 tons, Bureau of Public Roads: Neville Island, Pa., to United States Steel Supply Co., Pittsburgh.

210 tons, six state highway bridges, Boxford-



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Rowley - Georgetown - Newbury, Mass., to Bethlehem Steel Co.; Campanella & Cardi Construction Co., Hillsgrove, R. I., general contractor; 420 tons, structural steel to same fabricator.

REINFORCING BARS PENDING

4000 tons, Albeni Falls dam power house, Pend Oreille river, Washington state; bids to U. S. Engineer, Seattle, about Mar. 6.

2500 tons, Station No. 8, Public Service Co. of Northern Illinois, Joliet, Ill.

1630 tons, Rossford Ordnance Depot, Rossford, O.

1170 tons, Lake Shore-Belmont apartments, Chicago.

820 tons, apartments, Briar place & Sheridan road, Chicago.

525 tons, Lake Meadows apartments, Chicago.

500 tons, Lake City sewer system and treatment plant (near Seattle); $4 million project; general contract awarded.

435 tons, Altgeld Gardens extension, Chicago Housing Authority, Chicago.

400 tons, shop and technical building, Board of Education, Milwaukee.

390 tons, low rental housing, project Ill. 2-14, Chicago.

272 tons, Muscatine City Hospital, Muscatine, Iowa.

264 tons, Washington state road crossings, Clark and Lewis counties; bids to Olympia, Jan. 15.

190 tons, rapid transit project, CTS, Cleveland, O.

190 tons, Washington state highway projects; bids opened Jan. 4.

190 tons, Washington state highway projects, Chelan and Pacific counties; bids in Jan. 4.

175 tons, Kennewick, Wash., levee project and pumping plant; bids to U. S. Engineer, Walla Walla, Wash., Feb. 14.

150 tons, St. Thomas Hospital, Akron, O.

142 tons, Presbyterian Hospital addition, Chicago.

140 tons, rebids for municipal water reservoir; bids to W. O. Cuthbertson, city manager, Bend, Oreg., Jan. 15.

106 tons, car repair shop, Nickel Plate Road, Bellevue, O.

100 tons, 19-mile extension Potholes east canal, Columbia Basin project; bids to Bureau of Reclamation, Ephrata, Wash., Jan. 29.

100 tons, Upper Des Plaines intercepting sewer, contract 13, Norwood Park, Ill.

100 tons, hospital, New Castle, Pa.

Unstated, six Oregon state highway crossings, Wheeler county; R. H. Jones, Hillsboro, low, $106,071.

PLATES . . .

PLATES PLACED

700 tons, ten all-steel lighters, 80 x 30 feet, New York harbor, Pennsylvania railroad, to American Bridge Co., Pittsburgh; to be built at Trenton, N. J., shop.

PLATES PENDING

6200 tons, sheet steel and T-section piling for The Dalles dam, Columbia river; Columbia Steel Co., Portland, Oreg., and Inland Steel Co., Chicago, identical bids $591,800 to U. S. Engineer, Portland.

200 tons or more, two overseas barges for Young Bros., Ltd., Honolulu, T. H.; estimated cost $100,000 each; two bids in and award pending by Carl J. Nordstrom, naval architect, Seattle.

100 tons or more, bulk fuel and oil storage tanks, including 12 of 50,000-gallon capacity, Air Force base, Campbell, Ky.; bids Jan. 16.

100 tons plus, elevated tank, McChord air field, Washington state; bids in.

100 tons, 1-million gallon welded reservoir, Lakewood district, Pierce county, Washington; Pittsburgh-Des Moines Steel Co., Seattle, low, $19,885.

100 tons or more, 33 deck or liquid non-propelled cargo barges, 21 tons, 45 feet, sectionalized, Navy, Washington; bids in.

Unstated, two 120-foot tugs and two 170-foot bulk oil barges; bids to Federal Supply Service, Seattle, Jan. 23.

Unstated, coffer dam, penstocks, intake structures, etc., Chief Joseph dam, Washington state; bids invited Jan. 7 by U. S. Engineer, Seattle, for opening about Mar. 12.

Unstated tonnage, two bulk fuel storage tanks, 5100-barrel capacity each, Corps of Engineers, Savannah, Ga.; bids in.

Unstated, penstock sections, including two 51-inch branches, flanges, rings, etc.; bids to Bureau of Reclamation, Denver, Jan. 31.

PIPE . . .

STEEL PIPE PLACED

1300 tons, outside facilities Ladd air field, Alaska, also valves and fittings to the Crane Co., Seattle; Sound Construction & Engineering Co., Seattle, general contractor.

STEEL PIPE PENDING

Unstated, 300,000 linear feet 1-inch black steel pipe, delivery 100 days; 90 tons carbon steel available to contractor; bids to Bureau of Reclamation, Columbia Falls, Mont., Jan. 28.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Canadian Pacific, twelve 1600-hp diesel-electric combination freight and passenger locomotives, to Fairbanks, Morse & Co., Chicago.

Reading Co., 24 diesels, 12 to General Electric Co.; eight to General Motors Corp., and four to Baldwin-Lima-Hamilton Corp.

Transportation Corps, three 25-ton and fourteen 44-ton diesel-electric locomotives, to General Electric Co., Schenectady, N. Y.

RAILROAD CARS PLACED

1400 tons plus, tie plates, nuts and bolts, to Bethlehem Pacific Coast Steel Corp., Seattle, by Great Northern Railway.

1300 tons plus, tie plates, nuts and bolts, to Bethlehem Pacific Coast Steel Corp., Seattle, by Northern Pacific Railway.

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Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

Shenango Agaloy Tube Co.

Shenango Tube Co., Sharon, Pa., merged with Agaloy Tubing Co., Springfield, O. The new firm is named Shenango Agaloy Tube Co. and will have its principal offices in Sharon. The Springfield plant will operate as the Agaloy Division. Officers are: Don V. Sawhill, president; Ray F. Eisenbies and Carl E. Jones, vice presidents; Louis J. Wiesen, secretary; Ray W. Rowney, treasurer; O. L. Long, comptroller; James H. Flagg, assistant secretary.

Sharon Steel Reorganizes

Sharon Steel Corp., Sharon, Pa., announced liquidation into the parent company of its subsidiaries: Niles Rolling Mill Co., Niles, O.; Brainard Steel Co., Warren, O.; and its warehouses: Sharonsteel Products Co. (Michigan) and Sharonsteel Products Co. (Pennsylvania). Each of the subsidiaries involved are being operated as divisions of the parent company. No changes in personnel or management policies are involved.

New Vessel Honors Greene

Hull 189 was christened the *Edward B. Greene* at American Ship Building Co.'s yards at Toledo, O. The ship was named in honor of the chairman and chief executive officer of Cleveland-Cliffs Iron Co. Sponsor of the ship was Mrs. A. Dean Perry, Mr. Greene's daughter.

South Coast Gets Award

South Coast Co., Newport Beach, Calif., will construct six 144 foot minesweepers for the Navy at a cost of about $6 million.

Stainless Steel Pipe Offered

Damascus Tube Co., Greenville, Pa., formerly Vacuum Melt Inc., is offering welded stainless steel tubing and pipe in a size range of ½-inch to 3 inches. An expansion program now underway will increase production facilities. Officers of Damascus are: William B. Klee Jr., president, formerly with Copperweld Steel Co.; W. A. Johnson, general superintendent, formerly with Trent Tube Co.; Dr. John L. Thomas, treasurer.

Korhumel Steel & Aluminum

Korhumel-Heffron & Preiss Steel Co., Evanston, Ill., changed its name to Korhumel Steel & Aluminum Co. N. F. Korhumel, president, said several new appointments in the company's executive staff were made and are as follows: R. Richard Foster, executive vice president; Richard Devens, first vice president; P. R. Sonner, vice president; L. E. Coffin, vice president in charge of sales; F. H. Janin, assistant vice president; H. E. Blenner, assistant vice president; J. J. Foy, assistant treasurer.

Acme Steel To Build Plant

Construction of a $1 million plant for Acme Steel Co., Chicago, will start next spring in Toronto, Ont. The firm will produce steel strapping and seals for package reinforcements along with other steel specialty items.

Gear Maker Doubles Output

New Process Gear Corp., Syracuse, N. Y., almost doubled its output during 1951 in addition to investing about $5 million in new plants, machinery and equipment. About $4 million was invested in machinery and equipment in the new Syracuse plant; $1 million in the Auburn, N. Y., plant.

Offers Swiss Tools on Coast

Carl Hirschmann Co., Manhasset, N. Y., opened a western branch at 5124 Pacific Blvd., Los Angeles. The company offers a large selection of high precision Swiss machine tools, factory service and tooling counsel.

TC&I Dissolves Division

Farm Products Division, Tennessee Coal & Iron Division, United States Steel Co., was discontinued Jan. 1. The management believes that the purpose for which the Farm Products Division was established in 1925 has been fulfilled.

Belgian Firm Gets Rights

Marmon-Herrington Co., Indianapolis, manufacturer of electric trolley coaches, granted foreign manufacturing and sales rights for trolley coaches to Les Ateliers Metallurgiques, Nivelles, Belgium.

Bliss Gets Strip Mill Order

E. W. Bliss Co., Toledo, O., was awarded a $500,000 contract for the design and manufacture of hot strip mill auxiliary equipment in the Volta Redonda, Brazil, plant of Companhia Siderurgica Nacional (National Steel Co. of Brazil). The contract covers a hot strip mill coiler, conveyors, tables and hot coil handling

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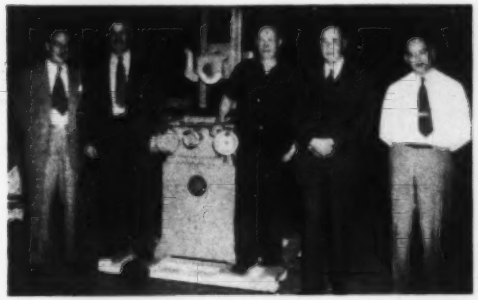


NOT TO MENTION PARTS: The 10,000th Reid Brothers Co. surface grinder was completed at the Reid plant at Beverly, Mass., in December, 1951. The machine was shipped by air from Boston to Los Angeles where it was needed for urgent defense work

equipment and is part of a vast expansion program undertaken by the company. The equipment will be built at the Bliss company's Rolling Mill Division in Salem, O., with deliveries scheduled to begin in the latter part of this year. Bliss recently completed the installation of roughing and finishing mills at the Peruvian mint, as part of other recent South American contracts.

Offers Couplings on Coast

Charles A. Fowler Co., San Francisco, was named by Zurn Western Services Inc. as Northern California representative for the sale of couplings produced by American Flexible Coupling Co., Erie.

Calumet Broadens Service

A district office serving the agricultural market was opened in Orlando, Fla., by Calumet & Hecla Consolidated Copper Co., Boston. E. G. Richardson was appointed agricultural field engineer and is in charge of the new operation. The office will serve as another channel in the distribution of the company's special grades of copper oxide for use in fertilizers, fungicides and animal feeds.

Builds Large Bearing Plant

Marlin-Rockwell Corp., Jamestown, N. Y., will begin construction at once on a $3 million super precision bearing plant in Falconer, N. Y. The structure is scheduled for completion by Oct. 1, 1952. Cost of the building itself is set at $1.3 million with equipment expected to cost another $1.7 million.

Forms Marine Industries Firm

Commercial Marine Industries was organized by business interests in Portland, Oreg. The company has taken over a 12-acre site and plant of the former Commercial Iron Works shipyard. The new firm also purchased the former Pacific Machine shop at Astoria, Oreg.

Builds Instrument Plant

United Geophysical Co. constructed a $750,000 plant at 1200 So. Marengo, Pasadena, Calif., for geophysical research and the manufacture of electronic equipment, cameras, seismometers, galvanometers and all recording instruments.

Plans Warehouse Addition

Woodward Co., steel warehouse concern in Albany, N. Y., plans construction of a $200,000 addition to its building as soon as possible, says Louis Woodward, president.

Enters Machine Tool Field

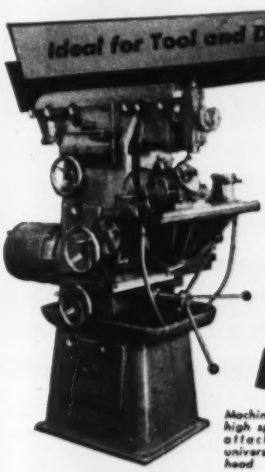
A business name has been filed in the Erie county, New York clerk's office for Echo Machine Tool, 217 Vulcan St., Buffalo, by Adelard J. Champagne.

Builds Aircraft Parts Plant

Pastushin Aviation Corp., Los Angeles, is building a plant at 12839 Chadron, Hawthorne, Calif., for production of aircraft components under subcontract from the aircraft industry. It will be the company's third plant.

Pennsalt Opens Oregon Plant

Pennsylvania Salt Mfg. Co. of Washington has begun operations at its plant in Portland, Oreg., for production of industrial cleaners. This is believed to be the first basic producer of its kind on the West Coast. The new plant will manufacture a complete line of specialty metal cleaners for a variety of metal-finishing operations, including electroplating, enameling, paint-



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ing, galvanizing, fabrication and assembly, aluminum anodizing and etching, as well as cleaners for the transportation, industrial and general maintenance fields. Fred C. Shanaman is president of the company.

Sterling To Open Ohio Plant

Production of gears, splines and gear boxes will start this month in Sterling Electric Motors Inc.'s $2 million plant in Van Wert, O. E. O. Danielson, Sterling's general factory manager, will be in charge of the Van Wert plant as well as the company's New York and Los Angeles plants. B. L. Peak will serve as superintendent of the Van Wert plant while E. K. Johnston will be general superintendent of Sterling's Los Angeles manufacturing facilities. This producer of variable speed and geared electric motors has manufacturing plants also in Hamilton, Ont., and Santiago, Chile.

Bay Air Engineering Corp.

Bay Air Engineering Corp., Los Angeles, Calif., was formed to perform aircraft subcontracting. Neil K. Tilton is president.

Art Metal Builds Addition

Art Metal Construction Co., Jamestown, N. Y., awarded a contract for erection of a factory addition which will have 3920 feet of floor space for manufacturing purposes. Estimated cost is $250,000.

Commercial Metals Expands

Commercial Metals Co. opened its $500,000 plant at Probandt and Simpson streets, San Antonio, Tex. One of the features of the plant's operations is a bailing press capable of turning out from 8 to 10 tons of compressed bundles of scrap in an eight-hour period. This plant is part of a $2 million expansion program announced by the company. A similar plant is under construction at Beaumont, Tex., and another is contemplated at New Orleans. The company maintains facilities at Houston and Dallas with headquarters at the latter point. Jacob Feldman is president of the company.

Food Machinery Buys Oakes

Food Machinery & Chemical Corp., San Jose, Calif., reached an agreement for acquisition of Oakes Mfg. Co. Inc., Tipton, Ind., producer of poultry and hog raising equipment. The purchase is subject to final corporate arrangements.

Engineering Firm Moves

P & J Engineering Co., Los Angeles, manufacturers of aircraft assemblies, moved to a new building at 7336 Bellaire Ave., No. Hollywood, Calif.

A. S. & R. Names Agent

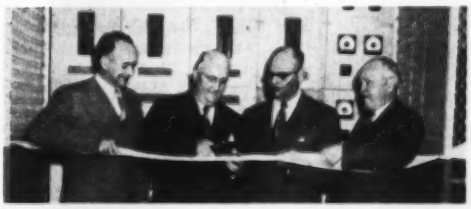
American Smelting & Refining Co., New York, appointed Copper & Brass Sales Inc., Cleveland, as distributor in that area for ASARCON 773 bronze continuous-cast bars and tubes. A recent development, the bronze is manufactured in 105-inch lengths, instead of conventional 13-inch lengths, permitting it to be cut to desired lengths with minimum waste.

Sargent Engineering Expands

Sargent Engineering Corp., 12533 E. 56th St., Huntington Park, Calif., is adding facilities for the manufacture of hydraulic cylinders for the Air Force and constructing a second story to the plant.

Purchases Canadian Firms

Marchand Furnace Co., Tilbury, Ont., and Advance Steel Products Ltd., Chatham, Ont., have been purchased by Yorkmont Securities Ltd., Toronto. In turn, purchase of these two properties by Maxwell Ltd., St. Mary's, Ont. has been approved by the Maxwell board of directors.



MOVING WAS A CHORE: A brief ceremony celebrates the opening of Reliance Electric & Engineering Co.'s new $1.8-million plant at Euclid, O. The ribbon-cutting took place after a strenuous two-week moving job from the old plant. On hand were W. R. Hough, J. L. Cox, K. J. Sims, and J. W. Corey, president of Reliance

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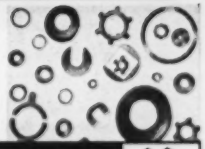

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One Plymouth Model KC Flexomotive, 65-Ton, Standard Gauge, Type 0-6-0, Built 1940

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STORAGE TANKS
6,000 Gallon
8,000 Gallon
10,000 Gallon

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As usable, Blast Furnace Shell with four stoves, dustcatcher and gas piping.

Steel shells on concrete foundation.

Furnace Hearth dimension—18 feet.

Stoves, inside dimension — 22 feet.

Available for inspection. Good condition.

Location—Windsor, Ontario.

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Brand New Whistler Die Set-Up
1—40" x 112" Magnetic Type Die Set—11.85", Shut Height
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1—Bonded Conveyor, Model SIC24, 35'0" long, 35" frame width, 24" belting, equipped with undercarriage, flareboards, Model TF gasoline engine, and roller chain and sprocket drive.
1—1940 White Dump Truck, 6 cyl., Model WA20, H.P. 30.5, Motor No. 120A 462.
1—1940 White Dump Truck, 6 cyl., Model WA20, H.P. 30.5, Motor No. 110A 175.
1—Bonded heavy duty vibrating screen, Model 2410B, two decks, 4' x 10' screening area 7½ HP, 3 phase, 60C, 220/440V, 1750 RPM motor.
Magnetic starter and push button station, pulleys and V-belts, flareboards.
1—39" Ohio Magnet and Generator Set, 15KW Generator, Cutler-Hammer Controls.
1—5500 # Demolition Ball.
1—Hercules 30-Ft. Conveyor.
1—15 KW U.S.A.C. Generator, 220 Volt, 3 Phase, 80 Cycle.

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Cleveland 14, Ohio

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BULLDOZERS, No. 25 and 27, W. and W.
HAMMER, NAZEL, 5-N, 6" x 6", M.D.
KEYSEATERS, Nos. 1, 2 and 5, BAKER.
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C. R. annealed in coils .015x2; SAE 1050—1060; Standard mill tolerance; 250,000 lbs. available immediately; price below warehouse. Brand new; wrapped in waterproofed paper. Address Box 427, STEEL, Penton Bldg., Cleveland 13, Ohio.

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Stainless Steel Strip In Coils

70,000#
6" x .032 (21 Gauge)
Type 430, #1 Finish
Cold Rolled, Annealed and Pickled
Gauge Tolerance:
Plus 0, Minus .002

GLAZER STEEL CORPORATION
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Used or Surplus Machinery and Equipment. Send in your copy instructions for an advertisement in this column. Your ad will reach the important men in the metalworking and metal-producing industry. Write to STEEL, Penton Bldg., Cleveland.

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FOR SALE—STEEL

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WRITE BOX 433 STEEL, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

1—Pair Woon Tables for Hot Sheet Mill.
1—156" x ¼" Sheet Squaring Shear.

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Cable Address "Foster Pittsburgh"

WANTED

TWO USED 7½ to 10 TON CAB-OPERATED BRIDGE CRANES

approximately 44' span. One 6 x 6 x ½" capacity double angle shear. Furnish full description, price and shipping point.

LEE C. MOORE CORPORATION
P.O. BOX 216, TULSA 1, OKLAHOMA

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All Kinds We Buy—We Sell Contact Us First

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12/20' Long
Old Style Acceptable

Send Lists of Other Machinery You Have for Sale.

SEABOARD STEEL CO., New Haven, Conn.

--CLASSIFIED--

Representatives Wanted

AGENTS WANTED

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MANUFACTURERS REPRESENTATIVE WANTED
— Commission Basis —

New York City, Philadelphia, Cincinnati, Indianapolis, Detroit, Chicago, St. Louis, Texas and California, by Fabricator of Wire Cloth, Perforated Metals, Filtering Materials, Small Stampings, and Assembly Work. Give full information first writing. Write Box 217, Cosheeton, Ohio.

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SALES REPRESENTATION AVAILABLE IN entire Michigan area. I am interested, as manufacturer's agent, exclusively in top-notch steel fabricated parts and industrial items. I have had four years' experience selling and have many good industrial contacts. Write Box 409, STEEL, Penton Bldg., Cleveland 13, O.

FORGE SHOP SUPERINTENDENT—EXPERI-enced in die design, estimating, production and costs on hammers, upsetters and presses, nonferrous and ferrous, available. Write Box 422, STEEL, Penton Bldg., Cleveland 13, O.

YOUNG, AGGRESSIVE EXECUTIVE DESIRES position as plant manager. Experienced in sales and purchasing. Journeyman tool and diemaker with engineering experience. Write Box 421, STEEL, Penton Bldg., Cleveland 13, O.

FOR CLASSIFIED RATES
And Further information write
STEEL, Penton Bldg., Cleveland 13, O.

Help Wanted

DISTRICT SALES MANAGER

Steel warehouse in Jersey City, N. J., servicing Eastern area. Must be thoroughly experienced in the sale and warehousing of flat rolled and allied products. Permanent connection with progressive organization. Salary commensurate with experience. Submit detailed resume. All replies strictly confidential. Our personnel know of this advertisement. Write Box 423, STEEL, Penton Bldg., Cleveland 13, O.

STEEL CASTINGS SALESMAN FOR STEEL Foundry in California making castings from 1—3000 pounds. State experience in full. Address Box 429, STEEL, Penton Bldg., Cleveland 13, O.

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TRENTON'S TOP 90 ACRE SITE

½-Mile front on the busiest division of the World's greatest PENNSYLVANIA RR MAIN LINE with a national advertising potential of up to 45 million yearly circulation. Between Sloane-Blabon and American-Standard. Big Steel—7 miles. Don't be talked off the MAIN LINE or our 100% LOCATION. J. F. A. Phillips, R2, Trenton, N. J.

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OPEN TIME
300 TON PRESS BRAKE
Will bend 20' x ¼" to 6' x ⅜" Pl.
ST. JOSEPH STRUCTURAL STEEL CO.
Box 68, Sta. "A", St. Joseph, Mo.

Employment Service

SALARIED POSITIONS $3,500 TO $35,000. WE offer the original personal employment service (established 41 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. BIXBY, INC., 110 Dun Bldg., Buffalo 2, N. Y.

Help Wanted

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For employment with a large midwestern plant specializing in the fabrication of steel, steel alloys, and aluminum products in connection with process plants and other equipment for the gas, petroleum and chemical industries. Must be capable of assisting in the administration of sales activities involving promotional sales work, customer contacts, selling, preparation of production orders and general coordination of distribution policies with sales manager. Man with chemical engineering background preferred between the age of 35/45 who has customer contacts in the fabricating and processing field and who has the sales qualifications for dealing with people and coordinating the efforts of a sales organization. This position offers possible advancement to general sales manager.
Write giving background, personal data, and salary requirement—Box 428, STEEL, Penton Bldg., Cleveland 13, Ohio.

PRODUCTION METALLURGIST — PREFER recent metallurgical graduate with several years' mill experience for process control in mill producing high speed, tool, high temperature and specialty steels. Excellent opportunity for young man desiring experience in correlation of laboratory developments and mill processing. Reply giving details of education, experience, age, etc. Box 432, STEEL, Penton Bldg., Cleveland 13, Ohio.

FOREMAN FOR ELECTRIC ARC FURNACE department producing alloy, stainless, tool, and other specialty steels. Should have metallurgical education or training and 3-5 years' melt shop experience. Bright future in stable company. Send full resume of experience to Box 425, STEEL, Penton Bldg., Cleveland 13, O.

JUNIOR DRAFTSMAN

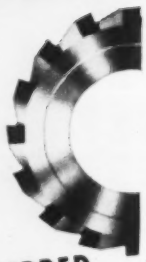
Old established New England firm. Opportunity for advancement. Will aid in obtaining or completing college education. Write stating experience, education and starting salary requirements. Reply Box 431, STEEL, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

With steel foundry background preferably with experience in foundry control work. Write stating experience, education, and starting salary requirements. Reply Box 430, STEEL, Penton Bldg., Cleveland 13, Ohio.

OPEN-HEARTH MELTER FOR STEEL foundry, basic experience preferred. Address Box 426, STEEL, Penton Bldg., Cleveland 13, Ohio.

PRECISION CIRCULAR CUTTERS



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MEYCO SOLID CARBIDE

MEYCO saws and cutters in various diameters and thicknesses can be furnished to your individual specifications. MEYCO cutters have earned an enviable reputation where long tool life and precision are a must.

Increase production in your slotting, venting and slitting operations by using MEYCO cutters. Please furnish complete specifications and quantities desired when requesting prices and indicate material to be cut.

Manufacturers of precision tools since 1888

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Punch press builder insures good lubrication with Farval

FARVAL—*Studies in Centralized Lubrication*
No. 126

ON this Warco press, there are no grease cups. Nothing is left to the judgment of the man with an oil can. The machine is protected by a Farval Centralized System of Lubrication.

Farval makes it routine to see that every bearing regularly gets the exact, measured amount of lubricant it requires. Each work shift, a few strokes of a hand pump lever provide adequate lubrication and keep the press running at top efficiency.

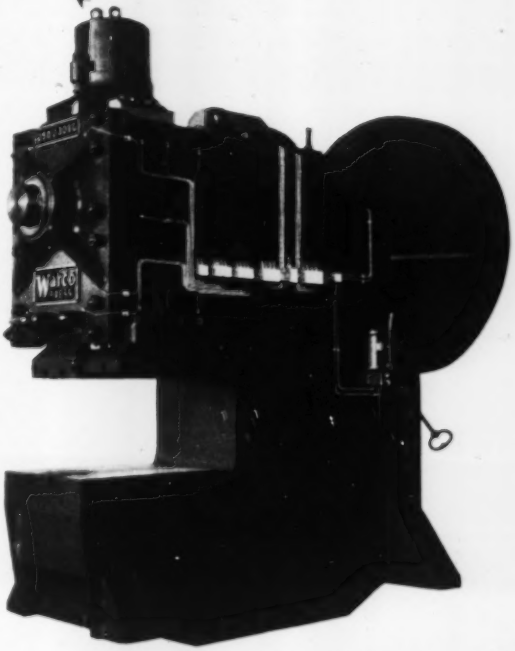
With Farval, special oilers are not needed, lubricant consumption is reduced, bearing life is extended materially and shutdowns for oiling or bearing replacement are eliminated. In short, with Farval on the job, the purchaser of a Warco press is insured of getting all the value built into the machine by its manufacturer.

Farval is the original Dualine system of centralized lubrication for industrial equipment, proved practical in 25 years of service. The Farval valve has only two moving parts — is simple, sure and foolproof, without springs, ball-checks or pinhole ports to cause trouble. Through its full hydraulic operation, the Farval system unfailingly delivers oil or grease to each bearing—as much as you want, exactly measured—as often as desired. Indicators at all bearings show that each valve has functioned.

In or near your city there's a Farval engineer, ready to discuss your lubrication problems and suggest a proper system to meet your particular needs.

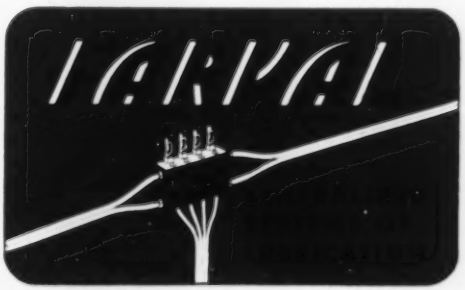
The Farval Corporation, 3270 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm and Gear Company. Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



KEYS TO ADEQUATE LUBRICATION—Wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine will be properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.

Photo above by courtesy Federal Machine and Welder Co.



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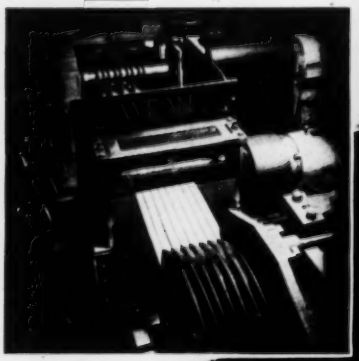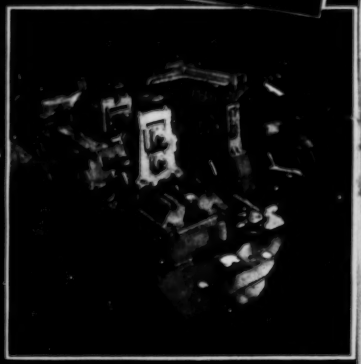
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